JDO

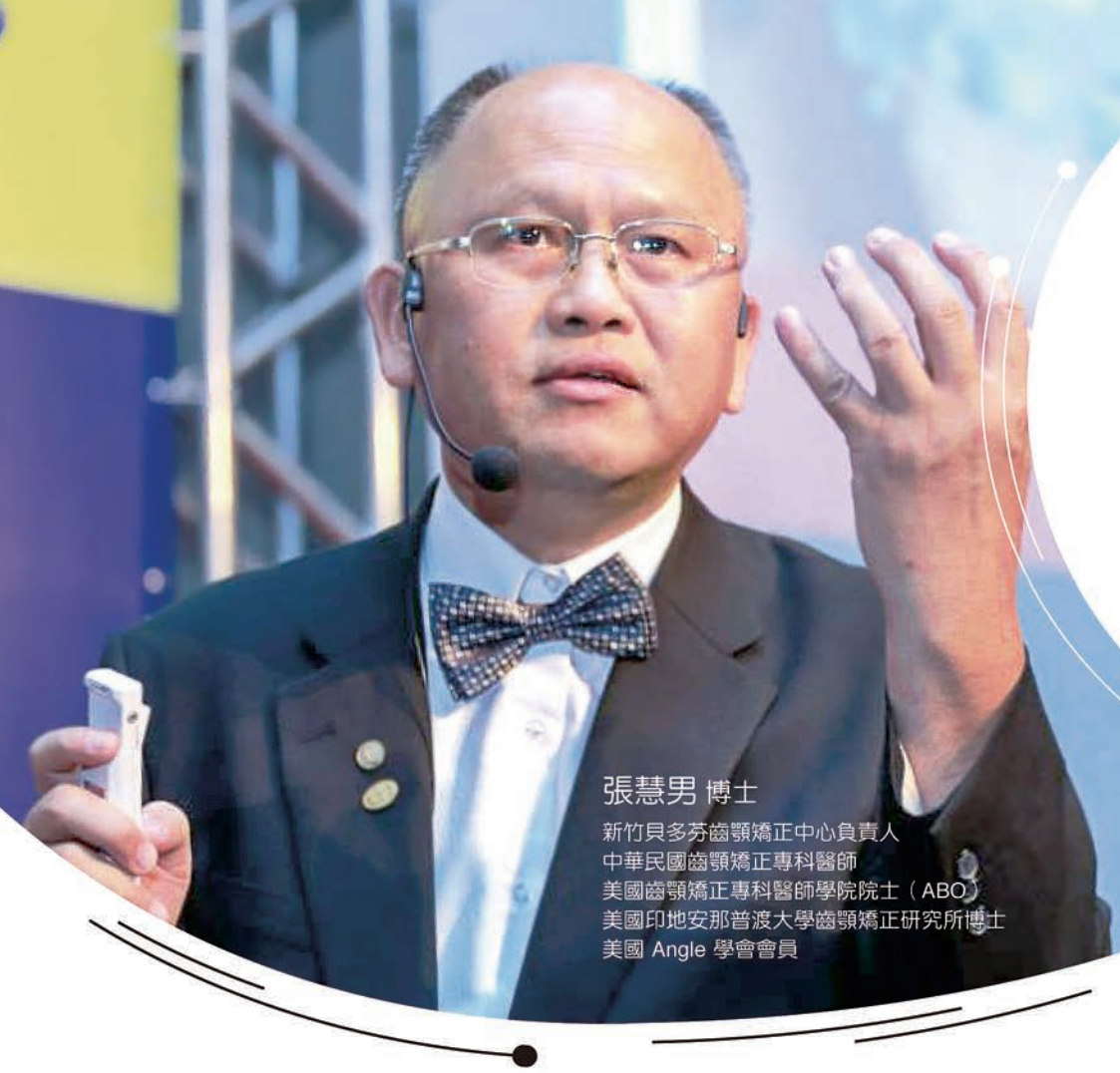
Journal of **D**igital **O**rthodontics
International Journal for Orthodontists and Implantologists

Vol. 61 Jan 1, 2021

Starting from this year, JDO will include a supplementary chapter on Taiwanese lifestyle through the eyes of CC (that is, Dr. Chris Chang). This eco pond is a seemly combination of nature, beauty, and human interaction therewith, which can accommodate not only aquatic lives, but also humans and all other sentient beings - mainly, CC, who now spends most of his leisure time by, and even inside, the pond with his fishes, turtles, and aquatic plants.

ISSN 2523-9392
977 2523939 006

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



2020-21
熱愛學矯正

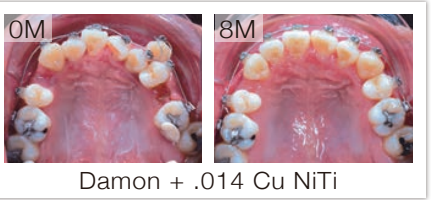
全新的貝多芬高效 Damon 矯正大師列課程是由國際知名講師張慧男醫親自規劃及授課，課程特色強調由臨病例帶動診斷、分析、治療計畫擬與執行技巧。此外，透過數位影片覆觀看，課堂助教協助操作，以及間臨床見習，讓學員在短時間能快上手，感染「熱愛矯正學，熱愛學正」的熱情。

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.

2021	A班	B班		A班	B班
Module 1 -	4/22	5/20	Module 7 -	9/9	10/14
Module 2 -	5/13	6/3	Module 8 -	9/16	11/4
Module 3 -	5/27	6/24	Module 9 -	10/21	11/25
Module 4 -	6/17	7/29	Module 10 -	11/11	12/9
Module 5 -	7/8	8/12	Module 11 -	12/23	12/30
Module 6 -	8/5	9/30			



Damon + .014 Cu NiTi

Excellent Finishing

(Tue) 9:00-12:00 中文授課

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

Finishing XII

Module 1 -	7/21	Module 7 -	1/12/21'
Module 2 -	8/11	Module 8 -	2/23
Module 3 -	9/8	Module 9 -	3/16
Module 4 -	10/20	Module 10 -	4/13
Module 5 -	11/17	Module 11 -	5/11
Module 6 -	12/15		

Damon Clear

International Workshop

(Digital Orthodontics, OBS & VISTA)

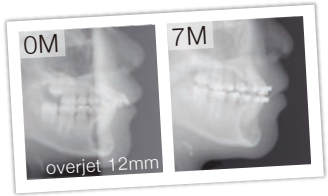
English Class

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

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

2021

Class 1 - **May 18-21**
Class 2 - **Dec 07-10**



Damon + Bite Turbo + Early Light Short Elastic

每次上課請依最新一期 JDO 公告為主

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

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

About Taiwanese Lifestyle

During the last year, with a non-existent international traveling schedule, I have had time to consider 3 questions that I have often been asked when abroad:

1. How can such a small country like Taiwan be at the summit of the world's semi-conductor industry?
2. How did Taiwan manage to produce international orthodontic speakers?
3. What does the typical Taiwanese lifestyle look like?

The answer to these three questions has always been that I don't know.

Do we need to know the answer to every question?

If I don't know the answer to these questions, then what do I know?

Well, what I do know is that our JDO has been continually receiving good feedback and the greatest compliment is that this humble local Taiwanese offering to the Orthodontic community has led me to be invited to join one of our community's most prestigious journals, the AJODO, as an editor member. Not bad for somebody who cannot even answer three easy questions! Obviously, my editor work with the AJODO will not allow me to answer such questions, so I have decided to use our very own JDO in an attempt to fathom out some answers.

Therefore, starting from the next issue, we will include a supplementary chapter about Taiwanese lifestyle through the eyes of CC (*Chris Chang*). Hopefully, as all the questions are intrinsically linked to Taiwanese lifestyle, we (*or hopefully you*) will be able to figure out the answers to the other two questions.

The first of these chapters will relate to nature, beauty and human interaction therewith - how to design, build, and maintain an eco pond which can accommodate not only fishes, turtles, and aquatic plants, but also humans (*mainly myself dangling my feet in the pond*) as well as all other sentient beings. Sounds easy, doesn't it? I hope that you will look forward to this new chapter, and enjoy the rest of the journal, as we continue on our never-ending journey along the path to glory.

Chris Chang PhD, ABO Certified, Publisher of JDO

Pseudo-Class III Malocclusion in an Adolescent Treated with Mandibular Bone Screws and Bite Opening to Enhance Late Maxillary Growth

Abstract

***History**: A 12-year-old female presented with a chief complaint (CC) of anterior crossbite.*

***Diagnosis**: Skeletal Class III (SNA 77.5˚, SNB 82˚, ANB -4.5˚) relationship in centric occlusion (C_O) was associated with midface deficiency, crossbite of the entire dentition except the molars, and lingually inclined lower incisors (L1 to MP 75.5˚). The Discrepancy Index (DI) was 28.*

***Treatment**: Bone screws were placed in the mandibular buccal shelves to retract the mandibular arch. To enhance adolescent maxillary growth, the bite was opened at the start of treatment with posterior bite turbos, and Class III elastics were applied. Left posterior crossbite was corrected with cross elastics. Lower arch retraction was limited by soft tissue impingement in the retromolar area.*

***Outcomes**: After 25 months of active treatment, a near ideal profile and occlusal alignment was achieved. The Cast-Radiograph Evaluation (CRE) was 19. Pink and White esthetic score was zero. There were two discrepancies from ideal: crossbite of the upper left second molar, and excessive lingual inclination of lower incisors (66.5˚).*

***Conclusions**: This case report demonstrated the use of OBSs to resolve skeletal Class III malocclusion in a growing adolescent. Class III elastics in addition to bite opening for removal of incisal constraint resulted in enhanced anterior growth expression of the maxilla. A single phase of treatment in the early permanent dentition efficiently resolved a difficult skeletal Class III malocclusion. (J Digital Orthod 2021;61:4-22)*

Key words:

Pseudo-Class III, anterior crossbite, late maxillary growth, passive self-ligating brackets, mandibular buccal shelf, bone screws

Introduction

Class III malocclusion is defined by Angle[1] as a condition in which the relationship of the jaws is abnormal. Compared to normal, all mandibular teeth occlude more mesial by the width of one bicuspid or more. About 5% of ethnic Chinese adolescents are affected by Class III malocclusion.[2] Etiology is classified as (*a*) *functional,* which is associated with abnormal tongue placement or neuromuscular conditions; (*b*) *skeletal,* when the maxilla is underdeveloped and/or mandible is overdeveloped; and (*c*) *dental,* due to ectopic palatal eruption of maxillary incisors or the early loss of lower deciduous molars.[3] Class III malocclusions of dental origin often involve a substantial functional shift of the mandible to achieve posterior occlusion, so they are defined as pseudo-Class III.[4,5] When the mandible is closed in centric relation (C_R), the incisors often show an end-to-end relationship, and molars are Class I. When the

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

mandible shifts anteriorly to achieve full posterior occlusion, the molars shift into a Class III occlusion. Pseudo-Class III malocclusion is usually amenable to conservative orthodontic treatment.[6]

Pseudo-Class III patients with good growth potential are candidates for early intervention. Typically, the bite is opened and incisal angulations are corrected to resolve the anterior crossbite.[3,7,8,9] Adolescents with midface deficiency may also benefit from eliminating restraints to maxillary growth. A 5-year cohort study[7] was conducted on 25 young Chinese patients with pseudo-Class III malocclusion treated to a stable result with a 2x4 appliance during mixed dentition. However, 20% of the sample required a second phase of comprehensive fixed appliance

Fig. 1: Facial and intraoral photographs at 9y11m

therapy which may be viewed as a psychological and/or financial burden. Introduction of temporary anchorage devices (*TADs*)[10] provided the option for retraction of the entire lower arch. An additional advantage for resolving anterior crossbite during the growing years is facial growth to help resolve the skeletal discrepancy. Enhancing the potential for maxillary growth is a particularly important strategy for pseudo-Class III patients with midface deficiency.

History and Etiology

A relatively immature 9yr-11mo-old female sought orthodontic consultation for an anterior crossbite. Her facial profile was unesthetic due to both midface deficiency and mandibular prognathism (*Fig. 1*). No contributing medical or dental history was reported. Clinical examination revealed a concave facial profile, lower lip protrusion, anterior crossbite, and lingual crossbite of left molars. Buccal segments were Class I on the right and Class III on the left. An edge-to-edge incisal relationship was noted when the

Fig. 2: Pre-treatment facial and intraoral photographs at 12y9m

mandible was guided to C_R. Intraoral examination revealed all primary molars and both primary upper canines were present. Early intervention therapy with 2x4 appliances or rapid palatal expansion (*RPE*) was proposed, but the deep Curve of Spee and anterior deepbite suggested that a second phase of orthodontic therapy would be required. To control the financial impact, the family preferred only one phase of treatment: comprehensive management after the permanent buccal segments erupt.

Fig. 3: Pre-treatment panoramic radiograph

The patient was recalled three years later at 12y9m of age for a follow-up orthodontic evaluation (*Fig. 2*). The malocclusion remained stable as the buccal segments erupted. Overjet was -3mm, overbite was 6mm, and there was a full-cusp-Class III relationship in C_O. In C_R, the incisors were end-to-end with asymmetric buccal segments: Class I right and end-on-Class III left. There was no significant crowding in either arch.

Panoramic (*Fig. 3*) radiography was within normal limits (*WNL*). Lateral cephalometric radiographs (*Fig. 4*) revealed decreased inclination of the incisors in both arches and a relatively straight profile when the patient was in C_R. The decreased SNA angle (*77.5°*)

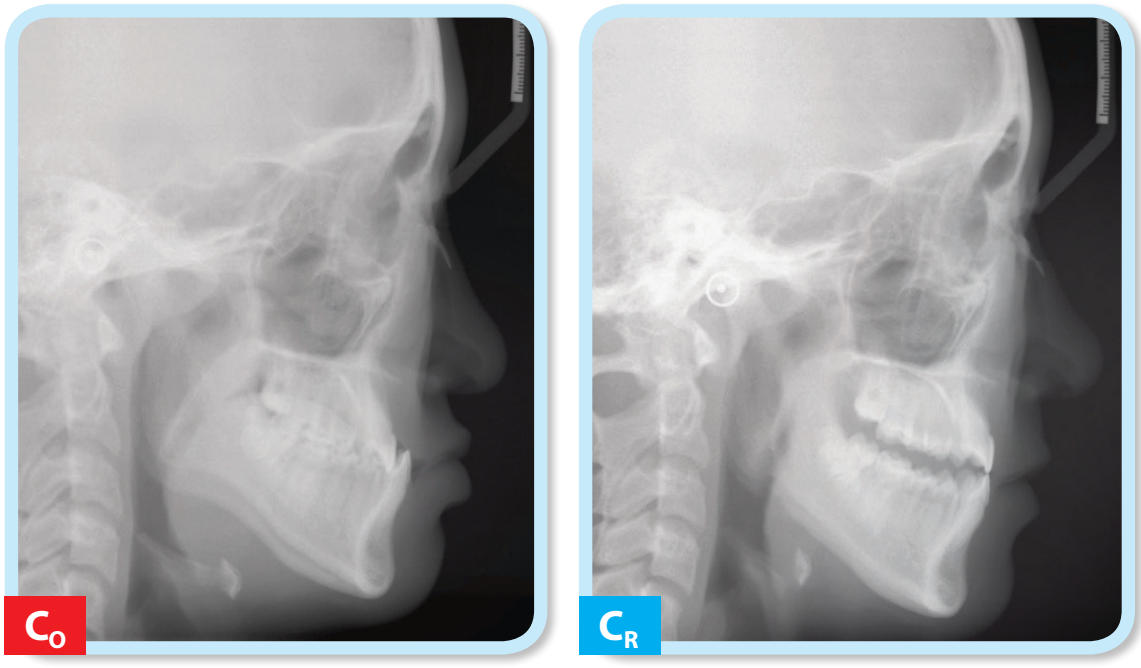


Fig. 4: Cephalometric radiograph in the C_O (left) and C_R (right) positions. See text for details.

contributed to midface deficiency. Some maxillary growth potential was expected, so comprehensive orthodontic treatment was indicated to correct the anterior crossbite (*Fig. 5*).

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

Diagnosis

Facial:

- Facial Convexity: *Concave (-3˚ G-Sn-Pg')*
- Lip Protrusion: *Retrusive upper and protrusive lower lip (-2.5mm/1mm to the E-line)*

Skeletal:

- Sagittal Relationship:
  - *Mild Skeletal Class III at* C_O *(SNA 77.5˚, SNB 82˚, ANB -4.5˚)*
  - *Skeletal Class I at* C_R *(ANB -1˚)*
- Mandibular Plane Angle: *WNL (SN-MP 33.5˚, FMA 26.5˚)*

Dental:

- Occlusion: *Class III molar relationship*
- Overjet: *-3mm*
- Lower incisor: *Retrusive (L1-NB 1.5mm), decreased axial inclination (L1-MP 75.5˚)*
- Crossbite: *All teeth except left molars*

American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*): 28.

Treatment Objectives

1. Level and align both arches.
2. Open the bite, and rotate the mandible posteriorly.
3. Encourage growth of the maxilla with passive self-ligating (*PSL*) appliances and Class III elastics.
4. Protract the upper incisors and retract the lower incisors to correct anterior cross-bite.
5. Optimize occlusal contacts with archwire finishing and posterior vertical elastics.

Treatment Plan

The objective for full fixed appliance treatment was to resolve the pseudo-Class III malocclusion, retract the lower arch, and protract the upper dentition. Three options were considered:

1. Non-extraction therapy to retract the lower arch with bilateral anchorage provided by the mandibular buccal shelf (*MBS*) OrthoBoneScrew® (*OBS*) (*iNewton, Inc., Hsinchu City, Taiwan*) bilaterally

2. Differential space closure following extraction of upper second premolars (*U5s*) and lower first premolars (*L4s*) that utilizes MBS OBS anchorage

3. Achieve ideal alignment with two-jaw orthognathic surgery.

First Option: directly addresses the anterior crossbite of the pseudo-Class III malocclusion. Bilateral MBS OBSs are required to retract the lower dentition to correct the anterior crossbite. This option is minimally invasive but it requires an extended treatment time.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	77.5°	80°	2.5°
SNB° (80°)	82°	81°	1°
ANB° (2°)	-4.5°	-1°	3.5°
SN-MP° (32°)	33.5°	35°	1.5°
FMA° (25°)	26.5°	28°	1.5°
DENTAL ANALYSIS			
U1 To NA mm (4mm)	4	4	0
U1 To SN° (104°)	101°	103.5°	2.5°
L1 To NB mm (4mm)	1.5	-1.5	3
L1 To MP° (90°)	75.5°	66.5°	9°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-2.5	-3.5	1
E-LINE LL (0mm)	1	-2	3
%FH: Na-ANS-Gn (53%)	50%	51.5%	1.5%
Convexity: G-Sn-Pg' (13°)	-3°	4°	7°

■ *Table 1: Cephalometric summary*

Second Option: efficient for anterior crossbite management, but closing extraction spaces in the absence of crowding may compromise incisal axial inclinations and complicate posterior lingual crossbite correction.

Third Option: corrects the skeletal discrepancy, but occlusal relationships deteriorate because the molars are Class I in C_R prior to treatment. Extensive orthodontics is required to align the dentition once the skeletal discrepancy is corrected. This option is undesirable because (*1*) surgical intervention is not necessary; (*2*) it is highly invasive; and (*3*) surgical correction of the jaws complicates orthodontic finishing.

After a discussion of the three options with the patient and her parents, the first option was preferred because it was expected to deliver a near ideal dentofacial result in a minimally invasive manner.

Treatment Progress

PSL appliances (*Damon Q®, Ormco Corporation, Brea, CA*) were initially bonded on all lower teeth, and a 0.014-in CuNiTi archwire was engaged. High-torque brackets were chosen for the anterior teeth, i.e., low-torque brackets positioned upside down to avoid loss of torque during retraction of the lower arch (*Fig. 6*). After one month of lower arch leveling and aligning, PSL brackets were bonded on the upper dentition utilizing low torque brackets on the incisors to resist Class III mechanics. Glass ionomer cement (*GC Fuji II®, GC America, Alsip, IL*) was applied

to the occlusal surfaces of the lower first molars (*bite turbos*) to open the bite for correction of the anterior crossbite (*Fig. 7*). Early light short Class III elastics (*Parrot 5/16-in 2-oz, Brea, CA*) were used for five months to correct the anterior cross-bite (*Fig. 8*). Once the anterior crossbite was resolved, the buccal occlusions was Class I (*Fig. 9*), so the glass ionomer bite turbos were removed.

In the tenth month, 0.016x0.025-in stainless steel archwires were placed in both arches, and Class III elastics were increased to Fox 1/4-in 3.5-oz (*Ormco, Brea, CA*) to reinforce the anterior crossbite correction. Upper archwire adjustment increased the root-palatal torque on the upper incisors and expanded the arch. In the 16th month of treatment, an OBS was inserted in each MBS to retract the lower arch. Computerized tomography documented that each OBS was buccal to the roots of the respective

Fig. 6:
Low-torque brackets were placed upside down on lower incisors. See text for details.

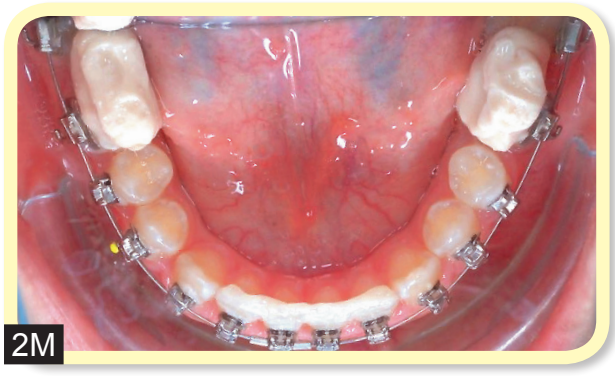


Fig. 7:
Occlusal view of bite turbos constructed at two months (2M) by placing glass ionomer cement on the occlusal surfaces of the lower first molars. See text for details.

Fig. 8:
Frontal view of bite turbos placed on lower first molars at two months (2M) into treatment to open the bite. Class III elastics were used to to retract the lower arch. See text for details.

Fig. 9:
Cephalometric radiograph exposed at 5 months into treatment (5M). Notice the crossbite was corrected and buccal segments were Class I. See text for details.

molars and well-anchored in the cortical plate (*Fig. 10*). Extra-alveolar insertion of a MBS OBS is crucial for en masse movement of the mandibular dentition without tooth root interference as the arch is retracted.

The OBSs were removed in the 22nd month when it was evident that the brackets of the lower second molars were embedded in the retromolar soft tissues (*Fig. 11*). This complication limited the amount of lower arch retraction. By the next appointment, all crossbites were corrected except for the left posterior segment. Buttons were placed on the lingual side of LL4, LL5, UL6, and UL7 to attach cross elastics (*Fig. 12*). A panoramic radiograph revealed problems with root parallelism that required bracket repositioning. Figs. 13 and 14 are panels of intraoral occlusal photographs showing treatment progress in the maxillary and mandibular arches, respectively. Immediately after the fixed appliances were removed, a mandibular 3-3 lingual retainer was bonded in place.

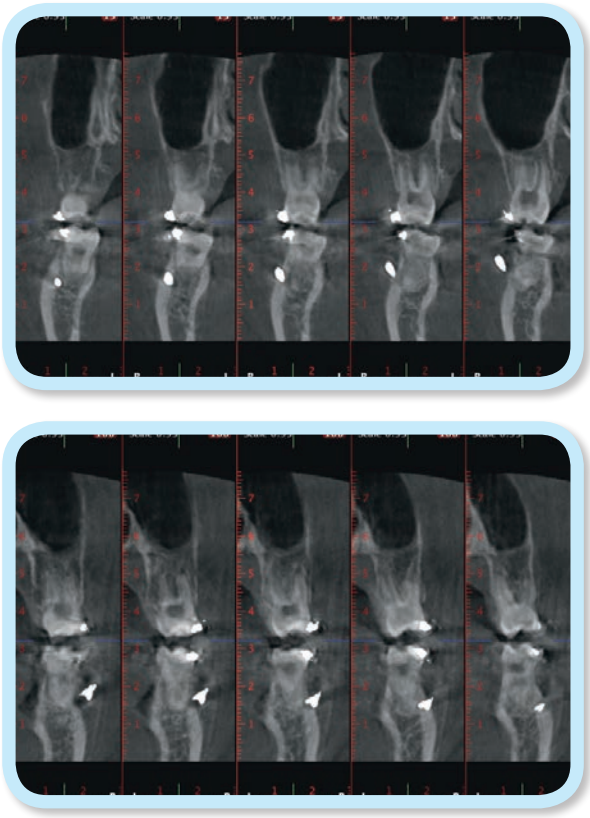


Fig. 10:
CBCT slices in the 16th month show the E-A insertion of mandibular shelf bone screws on the right (upper) and left (lower) sides.

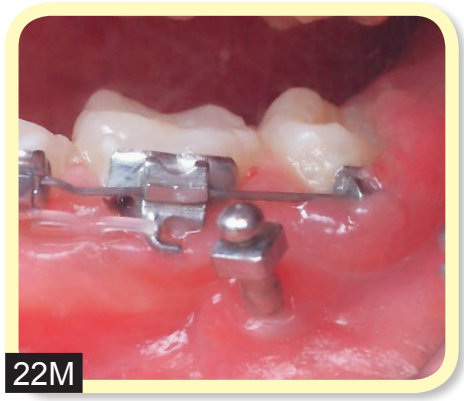


Fig. 11:
Retraction of the lower arch with Class III elastics resulted in the lower second molar brackets embedded into retromolar soft tissue in the 22nd month (22M). See text for details.

Fig. 12:
Crossbite at the left posterior region was corrected with cross elastics in the 23rd month (23M).

Fig. 13:
Maxillary occlusal views of treatment progress in months (M) and the mandibular archwire progression are shown from the start of treatment (0M) to twenty-three months (23M)

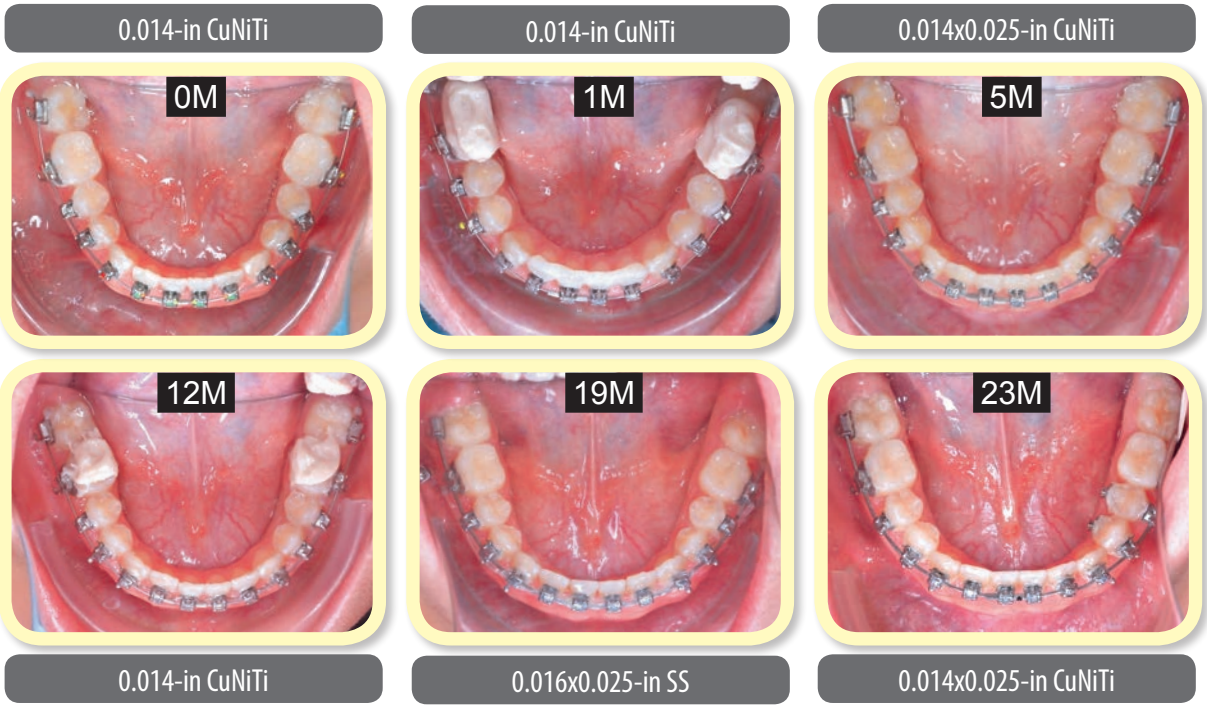


Fig. 14:
Mandibular occlusal views of treatment progress in months (M) and the mandibular archwire progression are shown from the start of treatment (0M) to twenty-three months (23M).

Results Achieved

After 25 months of active treatment, this difficult malocclusion (*DI = 28*) was treated to an optimal alignment (*CRE = 19*) with an excellent Pink and White esthetic score of zero (*see worksheets at the end of this case report*). Two discrepancies from an ideal outcome were noted: (*1*) lingually tipped lower incisors (*L1 to MP 66.5°*), and (*2*) lingual crossbite of the UL7. Post-treatment panoramic and lateral cephalometric radiographs are shown in Figs. 15 and 16, respectively. Although the UL7 was in crossbite, the occlusion was stable at the end of treatment (*Fig. 17*). After the functional shift was corrected, the facial profile was improved and buccal segments were in Class I occlusion. Superimposition of the pre-treatment and post-treatment cephalometric tracings reveal the late facial growth, dentofacial orthopedic changes of the maxilla, and posterior rotation of the mandible (*Fig. 18*). Fig. 19 is a panel of post-treatment facial and intraoral photographs. Assessment of specific objectives:

Maxilla (all three planes)**:**

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

Mandible (all three planes)**:**

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

Maxillary Dentition

- A-P: *Protraction of incisors and molars*
- Vertical: *Extrusion of molars*

Fig. 15: Post-treatment panoramic radiograph

Fig. 16: Post-treatment cephalometric radiograph

Fig. 17: Post-treatment dental models (casts)

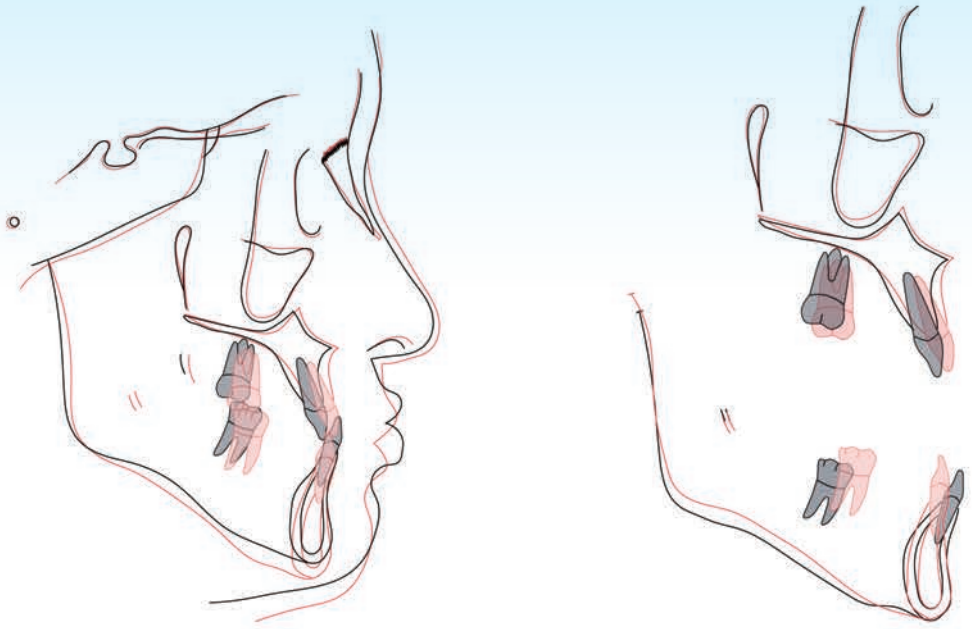


Fig. 18:
Superimposition of the pre-treatment (black) and post-treatment (red) cephalometric tracings shows the dentofacial effects of treatment.

- Inter-molar Width: *Decreased*

Mandibular Dentition

- A-P: *Retraction of incisors and molars*
- Vertical: *Maintained*
- Inter-molar/Inter-canine Width: *Increased/ Maintained*

Facial Esthetics

- Upper and lower lip: *Retraction of both lips*

Final Evaluation of Treatment

Clinical examination revealed an improved facial profile as the maxilla grew forward and the mandible rotated posteriorly. The inclination of the maxillary incisors was corrected to resolve the anterior crossbite and eliminate the $C_O \rightarrow C_R$ functional shift. The molars were extruded and the inter-molar width of the maxillary arch was decreased as the upper molars were protracted while the lower arch was retracted. Both lips were retracted relative to the E-line as the mandible rotated posteriorly. Dental alignment and esthetics were near ideal. The only significant discrepancies were crossbite of the upper left second molar and decreased axial inclination of the lower incisors. Two-year follow-up evaluation documented the stability of the final occlusion (*Fig. 20*). Neither relapse of the anterior crossbite nor excessive mandibular growth were noted.

Discussion

Managing adolescents with pseudo-Class III malocclusion requires diagnostic acumen to distinguish between a true skeletal Class III relationship as opposed to a pseudo-Class III with a functional shift. Correct timing for the intervention is

Fig. 19: Post-treatment facial and intraoral photographs

designed to maximize the treatment response while minimizing the burden on the patient. MBS OBSs provide E-A anchorage to conservatively resolve both the skeletal and pseudo-Class III components of a malocclusion.

Diagnosis

Pseudo-Class III malocclusion can be challenging to diagnose and treat. Skeletal Class III patients may have a mandibular length (*Co-Gn*) that is 3-6mm longer than for Class I subjects.[4] On the other hand, pseudo-Class III patients often have a mandible of average length, which results in a Class I buccal segments with edge-to-edge incisal contact in C_R. Mandibular protrusion into an exaggerated anterior crossbite is required for the posterior segments to occlude. Abnormal occlusal posture may contribute to an undesirable inclination of the incisors. Clinicians may overlook the functional and dental compensations associated with a pseudo-Class III malocclusion, and inappropriately refer the patient for orthognathic surgery as a skeletal Class III problem. To correctly diagnose pseudo-Class

Fig. 20: Intraoral photographs taken 2 years after treatment was completed

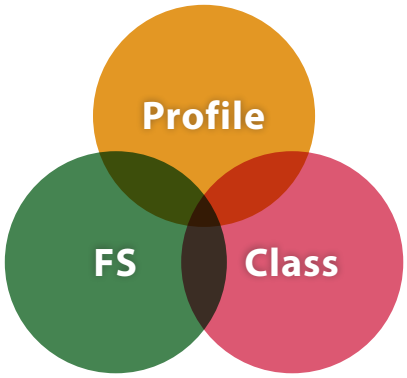


Fig. 21:
The 3-ring diagnosis system for pseudo-Class III malocclusion (Dr. Lin Jin-Jong)

III malocclusion, Lin devised the 3-ring diagnosis system (*Fig. 21*), which is composed of three diagnostic steps: [11,12]

- **Profile**: If the patient has an acceptable (*orthognathic*) facial profile when the mandible is in the C_R position, conservative orthodontic therapy is indicated.

- **Class**: Buccal segments at, or near, a Class I relationship in C_R is a favorable indication for nonsurgical correction. This diagnostic step can be interpreted liberally because osseous anchorage devices (*TADs*) can compensate for many dental alignment problems.[6]

- **Functional Shift**: The present patient had an edge-to-edge incisor relationship when the mandible was guided into the C_R position, i.e., about a 2mm $C_O \rightarrow C_R$ functional shift.

All three diagnostic criteria (*Fig. 21*) favored conservative orthodontic treatment without orthognathic surgery. However, the severity of the problem required opening the bite to produce posterior rotation of the mandible. In addition, treating the patient in the early permanent dentition resulted in a desirable forward growth of the maxilla.

Anterior Crossbite Correction

To provide clearance for anterior crossbite correction, glass ionomer cement (*bite turbos*) were placed on the occlusal surfaces of lower molars.[13] High torque brackets were selected for the lower incisors to resist retraction mechanics and Class III elastics. In contrast, low torque brackets were bonded on the upper anterior teeth to prevent flaring due to the anterior component of force for the Class III elastics. In retrospect, the high torque brackets for the lower incisors with the specified archwire sequence failed to correct or even maintain the axial inclinations of the lower incisors (*Fig. 18; Table 1*). This problem is related to the limit on lower arch retraction due to soft tissue impingement in the retromolar area (*Fig. 11*). Attempting to correct lower incisor root angulation with additional root lingual torque in the brackets or archwire may have resulted in relapse of the anterior crossbite.

Treatment Timing

Maxillary growth is helpful for correcting pseudo-Class III relationships that are associated with midface deficiency.[7] Use of RPE[14] and/or 2x4 appliances in mixed dentition takes advantage of maxillary growth.[7] Many anterior crossbites corrected in the mixed dentition require no further orthodontic treatment unless there are dental alignment problems such as crowding.

Pseudo-Class III patients with a deepbite and exaggerated lower Curve of Spee are difficult to resolve with 2x4 appliances and/or RPE in the mixed dentition. Although it may increase the financial and psychological burden for the patient and family, Phase I early intervention in the mixed dentition may require arch leveling and alignment prior to correction of the anterior crossbite. Furthermore, Phase II therapy is often required to achieve a stable result. If resolving the entire malocclusion with one stage of treatment is the priority for the family, comprehensive treatment should be delayed until the early permanent dentition (*~12yr of age*).

MBS OBS anchorage is effective for retraction of the entire lower arch to manage Class III malocclusion. Similar mechanics are also effective for pseudo-Class III problems in adults with no growth potential,[6] but maxillary growth in younger patients enhances the facial outcome.[15,16] Thus, for optimal facial esthetics, treatment in the mixed or early permanent dentition is preferable.[15]

With adequate clearance for anterior crossbite correction provided by posterior bite turbos, light short elastics and passive self-ligating brackets[17] deliver a continuous light mechanics to encourage anterior growth of the maxilla. This growth response was important for an optimal facial outcome for the present patient because of the pretreatment maxillary deficiency (*SNA 77.5°*) (*Figs. 18 and 19; Table 1*). Growth is not as important for patients with an ideal SNA prior to treatment. Dental compensations can be corrected at any age, but a favorable growth response requires intervention during the growing years. This case report demonstrates the advantage for treating pseudo-Class III malocclusion in an adolescent with PSL system and MBS OBS anchorage.

Residual Posterior Crossbite

Despite the correction of the anterior crossbite, the upper left second molar erupted into lingual crossbite. In retrospect, this problem was preventable with more posterior archwire expansion during treatment.

Fig. 22: Facial and intraoral photographs at 4 years post-treatment document the current condition of the patient.

Conclusions

Differential diagnosis of an anterior crossbite is essential for distinguishing a pseudo-Class III malocclusion that is amenable to conservative correction. Unlike a skeletal Class III relationship which requires complete growth of the mandible for predictable treatment, correction of pseudo-Class III is indicated during the growing years. Although the anterior crossbite of a pseudo-Class III is correctable in adults, a young growing patient with a midface deficiency usually achieves an enhanced facial outcome.

References

1. Angle EH. Classification of malocclusion. The Dental Cosmos 1899;41:248–264.
2. Lin JJ. Prevalences of malocclusion in Chinese children age 9-15. Clin Dent 1985;5:57–65.
3. Giancotti A, Maselli A, Mampieri G, and Spanò E. Pseudo-Class III malocclusion treatment with Balters' Bionator. J Orthod 2003;30(3):203–215.
4. Rabie AB, Gu Y. Diagnostic criteria for pseudo-Class III malocclusion. Am J Orthod Dentofacial Orthop 2000;117(1):1-9.
5. Gravely JF. A study of the mandibular closure path in Angle Class III relationship. Br J Orthod 1984;11:85–91.
6. Tseng LY, Chang CH, Roberts WE. Diagnosis and conservative treatment of skeletal Class III malocclusion with anterior cress bite and asymmetric maxillary crowding. Am J Orthod Dentofacial Orthop 2016;149(4):555-566.
7. Hägg U, Tse A, Bendeus M, Rabie AB. A follow-up study of early treatment of pseudo Class III malocclusion. Angle Orthod 2004;74(4):465-72.
8. Degala S, Bhanumathi M, Shivalinga BM. Orthopaedic protraction of the maxilla with miniplates: treatment of midface deficiency. J Maxillofac Oral Surg 2015;14(1):111-8.
9. Turley PK. Treatment of the class III malocclusion with maxillary expansion and protraction. Seminars in Orthodontics 2007;13(3):143–157.
10. Papadopoulos MA, Tarawneh F. The use of miniscrew implants for temporary skeletal anchorage in orthodontics: a comprehensive review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;103:e6–e15.
11. Lin JJ, Liaw JL, Chang CH and Roberts WE. Class III correction orthodontics. Taipei: Yong Chieh Enterprise Co, Ltd; 2013.
12. Lin JJ. Creative orthodontics: blending the Damon system & TADs to manage difficult malocclusion. 2nd ed. Taipei: Yong Chieh Enterprise Co, Ltd; 2010.
13. Tzatzakis V, Gidarakou IK. A new clinical approach for the treatment of anterior crossbites. World J Orthod 2008;9(4):355-65.
14. Rosa M, Lucchi P, Mariani L, Caprioglio A. Spontaneous correction of anterior crossbite by RPE anchored on deciduous teeth in the early mixed dentition. Eur J Paediatric Dent 2012;13(3):176–180.
15. Ochoa BK, Nanda RS. Comparison of maxillary and mandibular growth. Am J Orthod Dentofacial Orthop 2004;125(2):148-59.
16. Buschang PH, Jacob HB, Demirjian A. Female adolescent craniofacial growth spurts: real or fiction? Euro J Orthod 2013;35(6):819–825.
17. Yu YL, Tang GH, Gong FF, Chen LL, Qian YF. A comparison of rapid palatal expansion and Damon appliance on non-extraction correction of dental crowding. Shanghai Kou Qiang Yi Xue 2008;17(3):237-42.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 28

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 = 10

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 = 0

OCCLUSION

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

Total = 6

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 4

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 2 x 1 pt. = 2

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 = 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)	_____ 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	_____ x 2 pts. =	_____

Identify: Labially-positioned impacted maxillary canine

Total = 0

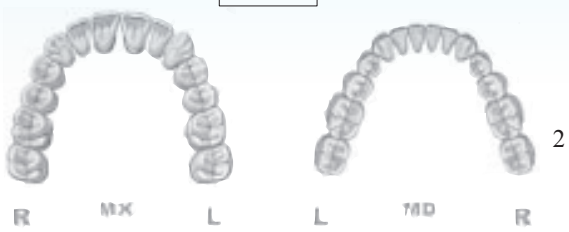
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 19

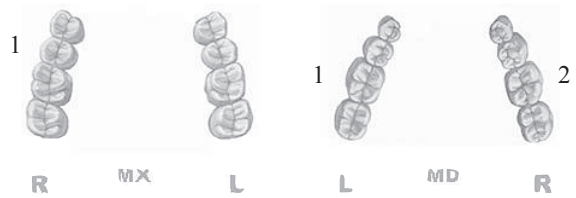
Alignment/Rotations

2



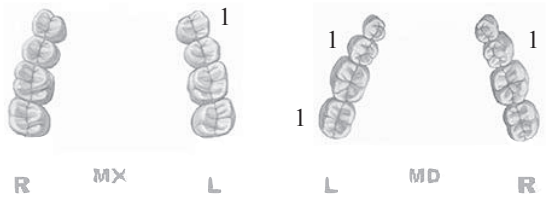
Marginal Ridges

4



Buccolingual Inclination

4

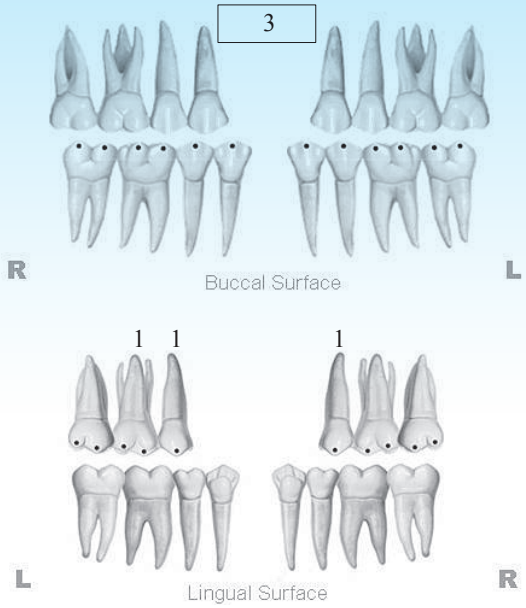


Overjet

3

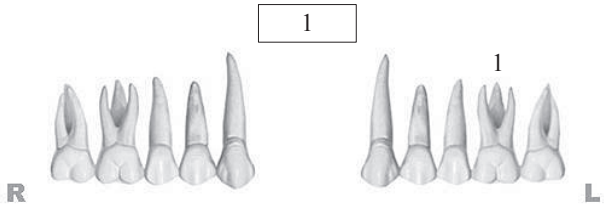
Occlusal Contacts

3



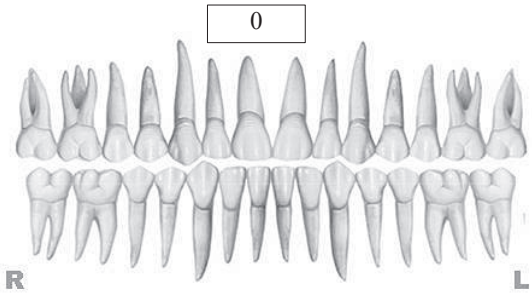
Occlusal Relationships

1



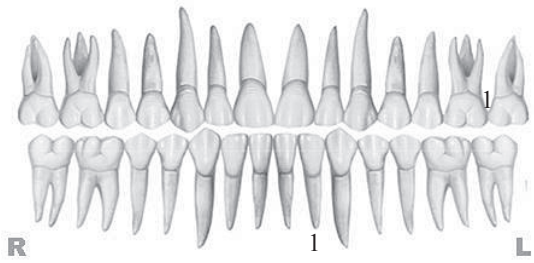
Interproximal Contacts

0



Root Angulation

2



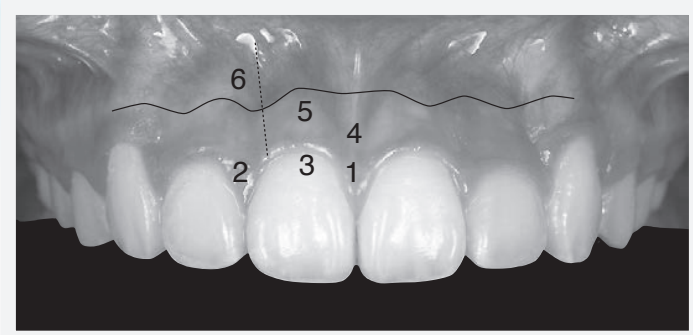
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

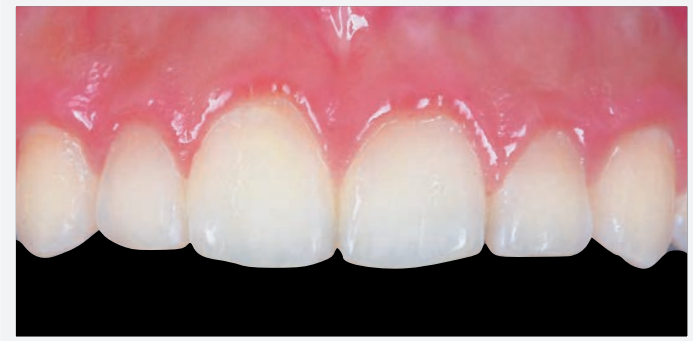
Total Score: = 0

1. Pink Esthetic Score

Total = 0



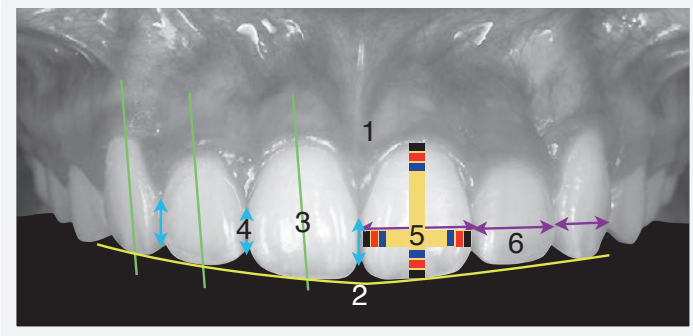
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



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

2020-2021 第十二年度

貝多芬 矯正精修班

時間：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：

2021

7/21、8/11、9/8、10/20、11/17、12/15
1/12、2/23、3/16、4/13、5/11

- 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

全新的第十二年度 2020-21 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。

2020-21 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＃201，蔡佳汶

Dental Clinic Established 1996
Beethoven

Simplified. Insights. Effective.
Maximize orthodontic learning value

2020-2021

Beethoven International Damon Master Program

Dr. Chris Chang
DDS, PhD. ABO certified, Angle Midwest
Beethoven Orthodontic Center, Taiwan

Beethoven International Damon Master Program, led by the world-renowned Dr. Chris Chang, is a 10-module course tailored for clinicians who desire to master the Damon System's treatment protocols with the combined use of mini-screws. The versatile course structure, including on-site lectures and hands-on workshops, as well as live webinars, allows participants to receive maximum learning value without interruptions to their busy practice schedule. Sign up now to experience Dr. Chris Chang's renowned effective teaching style!

1. Hands-on workshop

The course covers practices on a typodont and computer training on Mac. You learn best when you can have real hands-on experiences.

2. Chairside learning

Participants will have a chance to conduct chairside learning and observe clinical treatment process in Beethoven Orthodontic Center.

3. Free course videos

Participants will be offered recorded course videos free of charge. You can learn in efficient way by reviewing the videos anywhere on an iPad.

- Fees include tuition, workshop supplies, 3 nights of hotel (twin occupancy), e-handouts (iBooks), and course videos (iPad format).
- Mac laptop installed with the latest OS and Keynote software is advised, but not required, for the Keynote workshop. No PC.

Course Schedule **Time:** 9AM-5PM (GMT +8)

Module 1 June 11 Thu (Webinar)

1. Selecting your ideal first case
2. Bonding position
3. Four stages of efficient orthodontic treatment

Practice: Clinical photography

Module 2 July 16 Thu (Webinar)

1. Soft & hard tissue diagnostic analysis
2. Big overjet correction

Practice: Patient photo management

Module 3 Aug 6 Thu (Webinar)

1. Excellent finishing
2. Retention & relapse

Practice: Ceph tracing

Module 4 Sep 17 Thu (Webinar)

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

Practice: Ceph superimposition & measurement

Module 5 Oct 29 Thu (Webinar)

1. Class III correction
2. Class II correction

Practice: Case report demo

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

▲ Special lecture: 1:30-2:30 pm

Module 6 Nov 26 Thu (Webinar)

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

Topic: Modified VISTA (Dr. Bill Su)

Module 7 Dec 31 Thu (Webinar)

1. Asymmetry
2. Open bite

Topic: Modified 2X4 appliance in ortho treatment (Dr. Yu Lin Hsu)

2021

Module 8 Jan 14 Thu (Webinar)

1. Ortho-implant connection
2. Minor surgeries in orthodontics

Topic: Interdisciplinary approach (Dr. Grace Chiu)

Module 9 Mar 11 Thu (Webinar)

1. Aligner & TADs
2. Keys to aligner learning

Topic: Introduction to clear aligner treatment (Dr. Lexie Y. Lin)

Module 10 Apr 15-17 Thu-Sat

1. Model practice (Damon & OBS)
2. ABO DI, CRE workshop
3. Chair side observation
4. Clinic management
5. Keynote workshop: Photo taking and editing (template), Ceph tracing

Workshop in Taiwan (Newton's A & Beethoven Orthodontic Center)

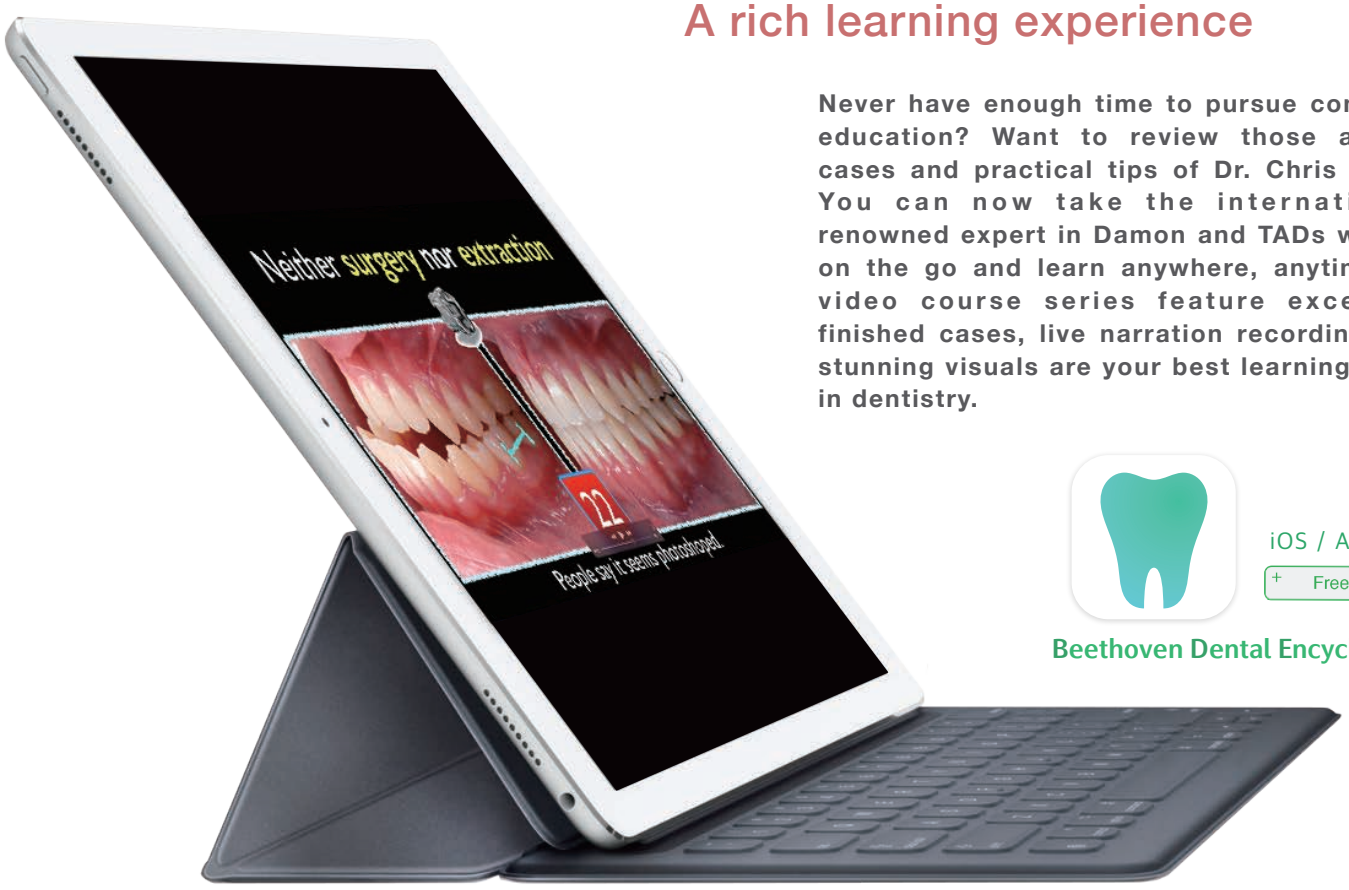
Location: 2F, 25, Jianzhong First Rd., Hsinchu, Taiwan



+886-3-5735676 #201 michelle@newtonsa.com.tw Michelle Tsai

e-Courses

A rich learning experience



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

iOS / Android

+ Free App

Beethoven Dental Encyclopedia

Series

narrated

Damon Master

Damon Master

narrated

Lecture

E-Lecture

narrated

OBS TAD

OBS (TAD)

non-narrated

Finishing

Finishing
(10 seasons)

non-narrated

Implant Forum

Implant Forum
(9 seasons)

non-narrated

Assistant

Assistant

non-narrated

E Ortho

E-Ortho

non-narrated

E Implant

E-Implant

non-narrated

E Pedo

E-Pedo

Note:

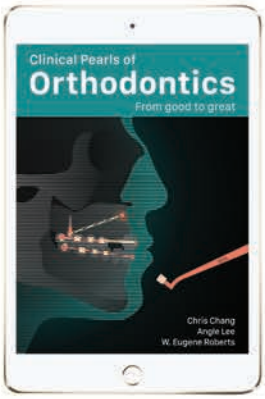
1. Most video courses are available in both English and Chinese and are sold separately.
2. Damon Master and OBS (TAD) are renewed annually and each renewal is to be purchased separately with a 50% discount.

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

e-BooK

Learn it your favorite way!

Best of all



+ BUY BOOK

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

The World's Best e-Textbook

Beethoven Dental Encyclopedia

e-Books collection

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

Now available in iBooks Store in 51 countries:

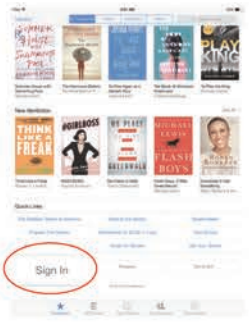
Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg,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

Get it on iBooks

Step-by-step Instructions

1. Launch "iBooks" app on your iPad.

2. Click "Store."

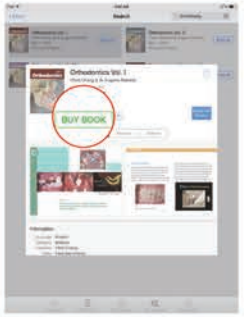


3. "Sign in" with your Apple ID.

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

5. Search for "chrischang."

6. Click the book's icon.



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

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

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

+886-3-573-5676

orthobonescrew.com

iNewton

Premolar Substitution for a Missing Maxillary Canine

Abstract

History: *A 19-year-old female presented with a chief complaint (CC) of missing maxillary left canine and crowding.*

Diagnosis: *A skeletal Class I (SNA 78˚, SNB 76˚, ANB 2˚) relationship was associated with a mandibular plane angle (SN-MP 31˚) that was within normal limits (WNL). This Class I malocclusion had an overjet of 2mm at the upper right canine (UR3), a missing upper left canine (UL3), and horizontal fractures (root and crown) of upper left lateral incisor (UL2). The Discrepancy Index (DI) was 9 for this unusual malocclusion.*

Treatment: *Translate the upper left first premolar (UL4) anteriorly to substitute for the missing UL3. The Damon Q® passive self ligating (PSL) system was used to align both arches. At the end of treatment, a diode laser was used for a midline frenectomy and selective gingivectomy in the maxillary anterior region to achieve better esthetics.*

Outcomes: *After 23 months of active treatment, the space for the missing UL3 was successfully substituted by the UL4. The Cast-Radiograph Evaluation (CRE) was 14, and the IBOI Pink & White esthetic score was 5.*

Discussion: *The most important advantage for tooth substitution in the maxillary anterior esthetic zone is permanence and biological compatibility. To achieve optimal esthetics, careful detailing is required during orthodontic treatment in addition to follow-up soft tissue and dental modifications. Compatible crown torque for all teeth in the segment is coupled with new techniques and materials in esthetic dentistry. The primary objective is to restore natural tooth shapes and sizes. In addition, it is important to provide symmetric gingival contours for all dental units, as well as to secure optimal occlusion with cuspid guidance or group function.*

Conclusions: *Interdisciplinary cooperation among orthodontists and other dental specialists is critical for achieving high quality treatment outcomes for premolar substitution to simulate a cuspid. (J Digital Orthod 2021;61:28-44)*

Key words:
Missing left maxillary canine, premolar substitution, canine guidance, group function, frenectomy, laser gingivectomy

Introduction

Management of a unilateral missing maxillary canine is a challenging task in dentistry.[1-12] Orthodontic space closure for dental substitution is an attractive option, but soft tissue and tooth modification are usually necessary for an optimal outcome. In contrast, prosthetic solutions are expensive, and longterm esthetics may be problematic. Due to its shape and position in the arch, the permanent canine is crucial for both functional occlusion and dentofacial esthetics. There are three treatment options for replacing a missing canine: premolar substitution, a tooth-supported pontic (*fixed prosthesis*), or an implant-supported crown. Specific criteria must be addressed. The preference for most patients is a minimally invasive option that achieves optimal esthetics and function. The orthodontist plays a key role by positioning teeth in ideal restorative positions, i.e., preprosthetic alignment.[1-12]

Yu Hsin Huang,
Resident, Shin Shang Dental Clinic (Left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

The nomenclature for this report is a modified Palmer notation. Upper (*U*) and lower (*L*) arches, as well as the right (*R*) and left (*L*) sides, define four oral quadrants: UR, RL, LR, and LL. Teeth are numbered 1-8 from the midline in each quadrant, e.g., a lower right first molar is LR6.

History and Etiology

A 19yr-2mo-old female sought orthodontic consultation to evaluate a fractured lateral incisor (*UL2*) and missing maxillary left canine (*UL3*) (*Figs. 1 and 2*). Contributing history was a car accident in 2015. Clinical examination revealed an acceptable

Fig. 1: Pre-treatment facial and intraoral photographs

facial profile. Overbite was 2mm. Overjet was 1-2mm at the incisal edges of the rotated upper central incisors (*Figs. 1 and 2*). Crowding was 6 and 4mm for the upper and lower arches respectively. The sagittal relationship of occlusion was Class I (*Figs. 1 and 2*). Panoramic and cephalometric radiographs provided pretreatment documentation (*Figs. 3 and 4; Table 1*).

Diagnosis

Skeletal:

- Class I relationship (*SNA 78˚, SNB 76˚, ANB 2˚*)
- Normal mandibular plane angle (*SN-MP 31˚, FMA 24˚*)

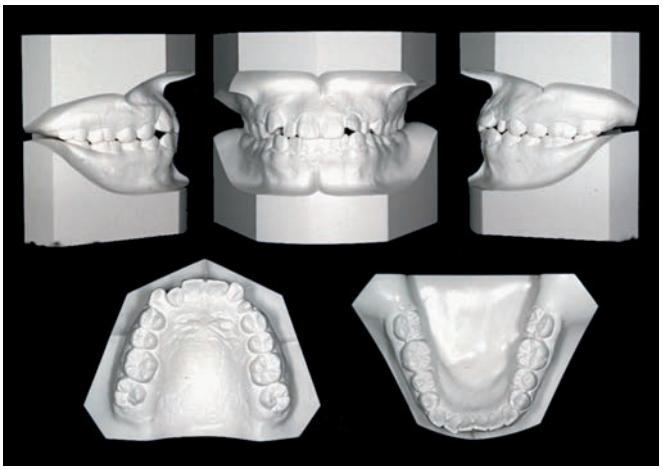


Fig. 2: Pre-treatment dental models (casts)

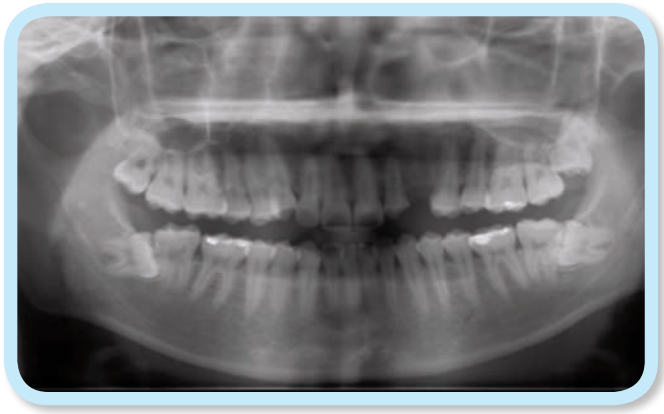


Fig. 3: Pre-treatment panoramic radiograph

Fig. 4: Pre-treatment lateral cephalometric radiograph

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA˚ (82°)	78˚	79˚	1˚
SNB˚ (80°)	76˚	77˚	1˚
ANB˚ (2°)	2˚	2˚	0˚
SN-MP˚ (32°)	31˚	31˚	0˚
FMA˚ (25°)	24˚	24˚	0˚
DENTAL ANALYSIS			
U1 To NA mm (4mm)	5	2	3
U1 To SN˚ (104°)	110˚	101˚	9˚
L1 To NB mm (4mm)	5	1	4
L1 To MP˚ (90°)	92˚	81˚	11˚
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-2	-4	2
E-LINE LL (0mm)	-1	-3	2
%FH: Na-ANS-Gn (53%)	54%	54%	0
Convexity: G-Sn-Pg' (13°)	9˚	10˚	1˚

Table 1: Cephalometric summary

Dental:

- Class I malocclusion
- Overjet/Overbite were both 2mm
- Missing UL3
- Horizontal fractures of the UL2, both the crown and the root

Facial:

- U/L lip position to the E-line was -2mm/-1mm

The American Board of Orthodontics Discrepancy Index (*DI*) score was 9.

Treatment Objectives

Maxilla (all three planes)**:**

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

Mandible (all three planes)**:**

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

Maxillary Dentition:

- A-P: *Slight retraction of incisors*
- Vertical: *Maintain*
- Inter-molar Width: *Decreased width as molars are protracted anteriorly*

Mandibular Dentition:

- A-P: *Retract incisors*
- Vertical: *Maintain*
- Inter-molar Width: *Decrease as molars are protracted forward*
- Inter-cuspid Width: *Maintain*

Facial Esthetics: *Maintain*

Treatment Plan

The overall objectives were to restore the missing UL3, retract the lips, and close interproximal spaces. Several options were considered:

1. Extract UR4, LL4, and LR4, and substitute the UL4 for the missing UL3.

2. Align and restore the missing UL3 with an implant-supported prosthesis.

3. Conventional fixed prosthesis to restore the UL3, utilizing the UL2 and UL4 as abutments

Option 1 was to create space in the other three quadrants by extracting UR4, LL4, and LR4. Utilize differential space closure in all four quadrants to substitute the UL4 for the missing UL3. Correct rotations and close all spaces to retract the lips. Reshape the UL4 as needed to simulate a UL3. This option is a minimally invasive approach to achieve optimal esthetics and function. ***Option 2*** requires less orthodontics, so the treatment time is less, but an implant-supported prosthesis is expensive and may result in a longterm esthetic compromise particularly if there is any remaining growth or occlusal adaptation. ***Option 3*** is non-extraction preprosthetic alignment for a conventional 3-unit bridge. The disadvantage for this approach is

extensive abutment preparation, i.e., a loss of 60-70% of crown structure for the abutments which may lead to endodontic and/or abutment fracture problems long-term.

After a careful discussion of the three treatment plans, the patient selected ***Option 1*** because of the potential for the most ideal dentofacial result. Furthermore, this alternative was the least expensive overall because it was less likely to result in longterm esthetic problems, and no special maintenance was required.

Treatment Progress

Extraction of the three first premolars (*UR4, LL4, and LR4*) was performed at the beginning of the treatment to provide space for initial dental alignment. A self-ligating fixed appliance (*Damon Q®, Ormco Corporation, Brea, CA*) was bonded on all upper teeth, and a 0.014-in CuNiTi archwire was engaged. A high-torque bracket was chosen for the UR3 in case of loss of torque during space closure. Standard-torque brackets were chosen for upper central and lateral incisors (*Fig. 5*).

Since the UL2 was fractured, tooth movement was minimized. To prevent interference with the lower brackets, bite turbos were placed on the lower first molars. A 0.018-in CuNiTi archwire was inserted to the maxillary arch. High-torque brackets were selected for lower canines, and standard-torque brackets for lower central and lateral incisors. A 0.014-in CuNiTi lower archwire was inserted (*Fig. 6*). During this period, early alignment of the upper and lower arches was achieved with progressive 0.014x0.025-in CuNiTi and 0.017x0.025-in TMA archwires. After thirteen months of treatment, posterior bite turbos were removed, and anterior bite turbos were placed on the palatal surface of the upper central incisors. In the 16th month of treatment, brackets on UR1, UL1, LL5 were repositioned to correct axial angulations. The UL4 was rebonded to adjust the gingival margin to simulate a canine. In the 20th month of treatment, a more rigid archwire 0.016x0.025-in SS was used for final space closure. After 23 months of active treatment, all appliances were removed, and two fixed retainers were delivered: a maxillary anterior 2-2 and a lingual mandibular 3-3. Removable clear overlay retainers were provided to maintain both arches.

To improve esthetics, a frenectomy and selective gingivectomy were performed with a diode laser.[6-8] The desired soft tissue margins were defined for the upper four incisors, right canine, and substituted left premolar (*Fig. 7*). Post-treatment records were collected: casts and photographs plus panoramic and lateral cephalometric radiographs (*Figs. 8-11*).

Results Achieved

Maxilla (all three planes)**:**

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

Fig. 5:

A progressive series of maxillary occlusal photographs document treatment progress in months (M) and the maxillary archwire progression from the start of treatment (0M) to twenty months (20M).

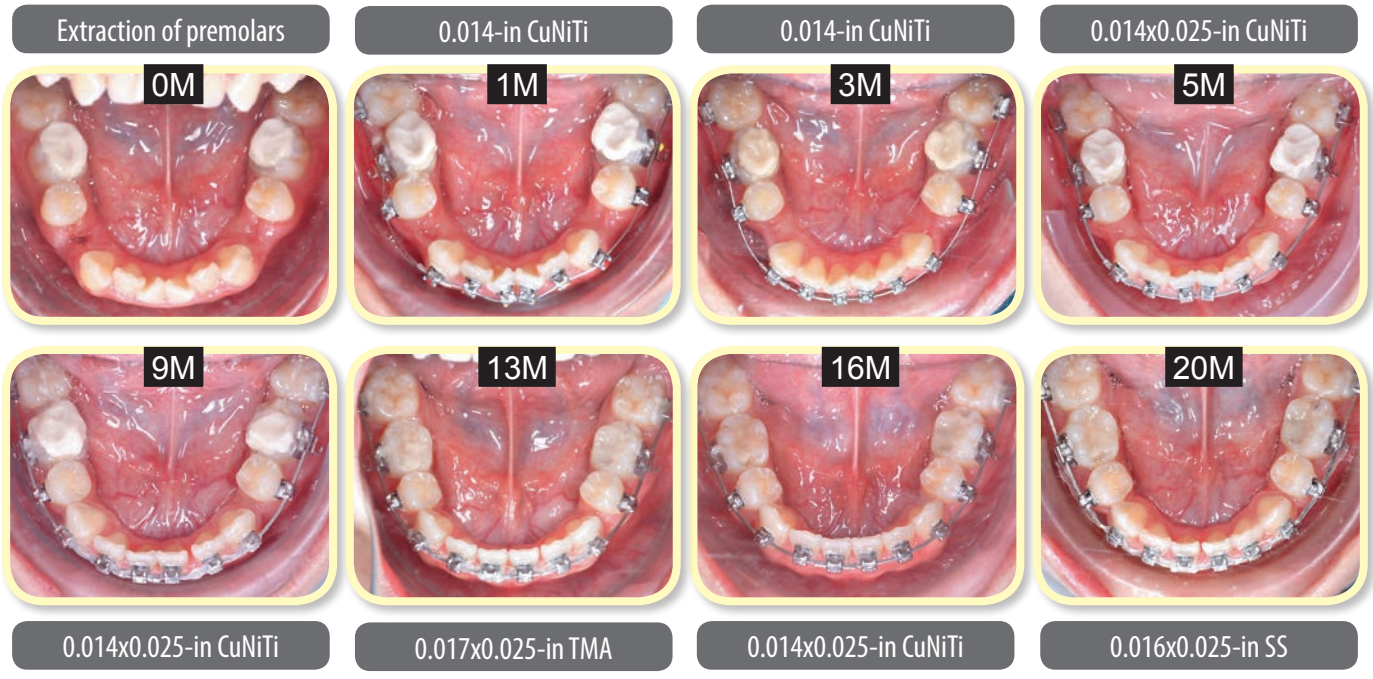


Fig. 6:

A progressive series of mandibular occlusal photographs document treatment progress in months (M) and the mandibular archwire progression from the start of treatment (0M) to twenty months (20M).

Fig. 7:
Frenectomy and gingivectomy in the maxillary anterior segment is shown in a progressive series of frontal intraoral photographs. The pre-treatment view is shown on the upper right. Bone sounding was performed for all anterior teeth and the volume of keratinized gingiva was determined. A maxillary midline frenectomy was performed (lower right). See text for details.

Mandible (all three planes)**:**

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

Maxillary Dentition:

- A-P: *Retraction of incisors; Protraction of molars*
- Vertical: *Maintained*
- Inter-molar Width: *Decreased*

Mandibular Dentition:

- A-P: *Retraction of incisors; Protraction of molars*
- Vertical: *Maintained*
- Inter-molar/Inter-canine Width: *Decreased/ Increased*

Facial Esthetics:

- Upper and lower lip: *No change in upper or lower lip protrusion*

Final Evaluation of Treatment

Superimposition of pre-treatment and post-treatment cephalometric tracings (*Fig. 12*) revealed no change in lip prominence, but the upper and lower incisors were uprighted, retracted, and intruded. U1-SN, U1-NA, L1-MP, and L1-NB were substantially decreased (*Table 1*). Extraction space was utilized to correct crowding and protract molars in both arches, but lip prominence was maintained. The mandible grew downward and forward (*Fig. 12*).

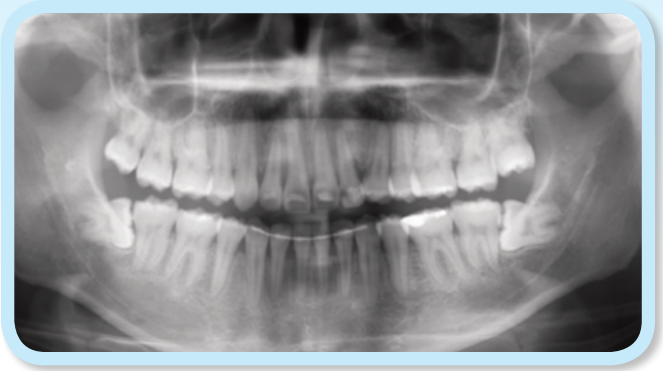


Fig. 8: Post-treatment panoramic radiograph

Fig. 9: Post-treatment lateral cephalometric radiograph

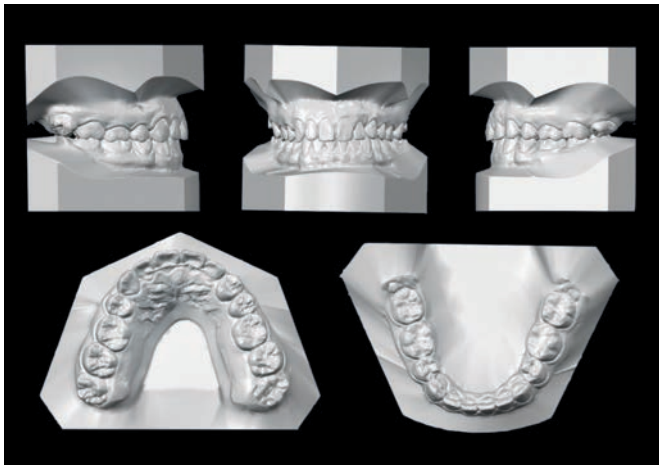


Fig. 10: Post-treatment dental models (casts)

The Cast-Radiograph Evaluation (*CRE*) score was 14 points. The principal residual discrepancies were anterior overjet, root alignment, and occlusal relationships. Bilateral horizontal impaction of lower third molars was an indication for extraction of all four third molars. Total active treatment time was 23 months to achieve optimal alignment. A diode laser was used for a maxillary midline frenectomy plus a modest gingivectomy in the maxillary anterior region. Post-treatment facial and intraoral photographs are shown in Fig. 11. The fractured UL2 was restored, but the gingival margin of the crown was recessed, consistent with excessive axial inclination of the root. The tooth was vital and there was no evidence of root resorption (*Fig. 8*).

Discussion

There are usually three options for replacing a missing canine: premolar substitution, tooth-supported fixed prosthesis, or an implant-supported prosthesis. Selecting the appropriate option depends on the malocclusion, specific space requirements, tooth-size relationship, size of the edentulous space, and the morphology of the contralateral canine.[1-3]

Orthodontic space closure to achieve premolar substitution is a good biologic solution, but the outcome may fail to have a natural appearance and achieve functional disclusion during lateral excursions of the mandible. Furthermore, retention of space closure may be difficult.[4]

When smiling, the contour of the gingival margins of the six maxillary anterior teeth (*esthetic zone*) plays an important role in dentofacial esthetics. The gingival

Fig. 11: Post-treatment facial photographs and intra-oral photographs document the correction after 23 months of active treatment.

margins for the central incisor, lateral incisor, and canine should have a high-low-high relationship.[1-8] More specifically, the gingival margin for central incisors should be on the same level and positioned more apically compared to the adjacent lateral incisors. The gingival margin for the adjacent canine should be at about the same level as the central incisor. For optimal dentofacial esthetics, the gingival margins should correspond to the cementoenamel junction (*CEJ*) for each tooth, be symmetric, and have a healthy gingival papilla in each interdental embrasure.[5]

Orthodontic intrusion and extrusion are common strategies for changing the clinical exposure of a tooth crown, but ultimately the clinical crown is determined by the level of a healthy epithelial attachment. To achieve the desired height of the gingival margin, it is usually necessary to intrude a mesially substituted first premolar.[6-8] However, optimal esthetics and function for simulating a canine usually requires adjustments of crown morphology for the substituted premolar. Crown lengthening procedures may be needed to achieve the desired gingival margin, but that option is not

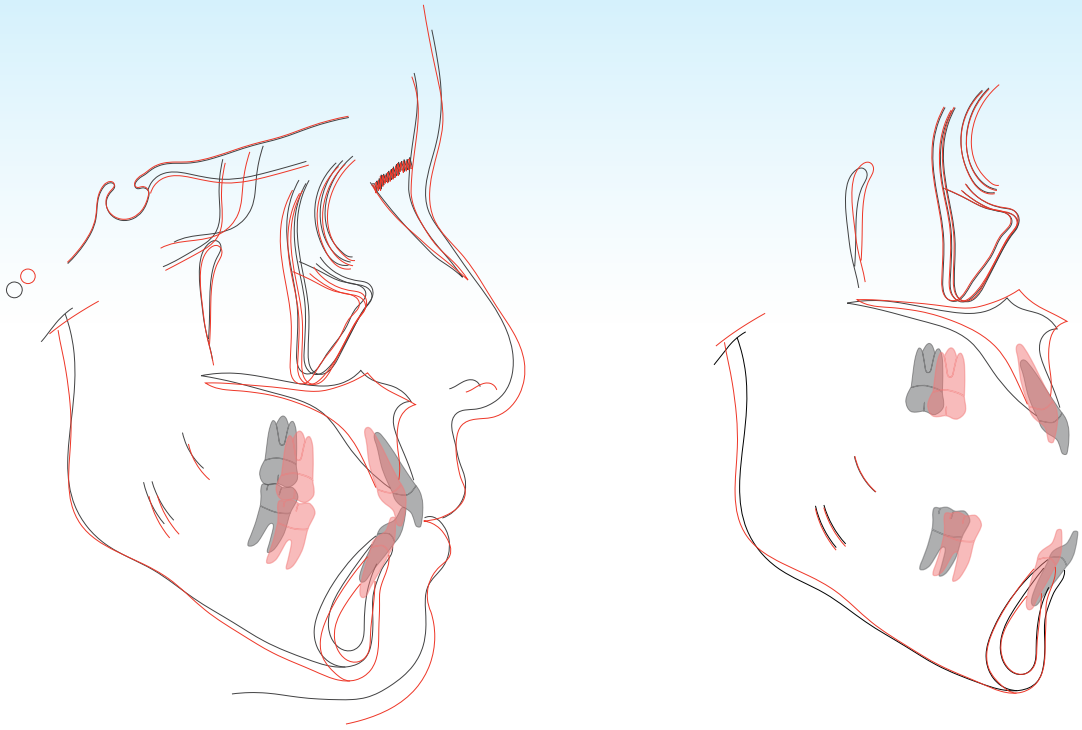


Fig. 12:
Initial (black) and final (red) cephalometric tracings are superimposed on the anterior cranial base (left), the skeletal structures of the maxilla (upper right), and the mandible (lower right).

always predictable. Typical problems may be loss of periodontal attachment, exposure of the CEJ, and denuded root surfaces (*sensitivity*).

Canine Shape

In the maxillary arch, the mesiodistal dimension for the first premolar is narrower than for the canine (*Table 2*). Reshaping of the palatal cusp as well as bonding and tinting may be required to effectively simulate a canine. Additional esthetic bonding is required to form a canine-like cusp tip.

Inclination and Root Eminence

A substituted first premolar usually requires intrusion, followed by restoration with composite

Fig. 13:
A drawing of an upper canine is superimposed on the adjacent first premolar to demonstrate the more prominent root and cervical enamel curvature of the canine (blue). For a first premolar to effectively simulate a cuspid, three morphologic changes are needed: 1. add resin at the gingival margin (blue area), 2. lengthen the buccal cusp, and 3. reduce the palatal cusp. See text for details.

resin or a porcelain veneer (*Fig. 13*). Intrusion of a maxillary premolar may not achieve adequate root prominence (*alveolar eminence*). Labial root torque may be required for more root prominence, as well as to avoid unesthetic exposure of the lingual cusp when smiling. In any event, the premolar should be properly aligned prior to modification of crown morphology.

Angulation and Mesiodistal Position

Compared to a premolar, the mesial surface of a canine is longer, and the contact point is closer to the incisal tip. Moreover, the long axis of canine is 17˚, and the premolar is 9˚ (*Table 2*), so the angulation of the premolar bracket requires adjustment. Once optimal pre-restorative alignment is achieved, restorative details can be adjusted with recontouring and esthetic bonding.

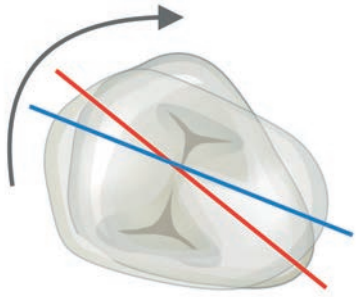


Fig. 14:
To present a more canine-like appearance, a first premolar requires slight rotation of the mid-frontal plane (blue line) to the mesial (red line).

Rotation

The mesial line angle of the first premolar is more prominent than for a canine. To simulate a more canine-like appearance, the first premolar is rotated slightly to the mesial by distally positioning the bracket on the crown (*Fig. 14*).

Bracket Selection

Buccal crown torque for a mesially substituted first premolar should be relatively perpendicular. Intrusion of the premolar increases the buccal crown torque. To resist this undesirable side effect, a pretorqued first premolar bracket is preferred because it has more negative torque (*-7˚*) than the canine bracket (*0˚*). In effect, the usual negative torque in a premolar bracket compensates for the positive torque that is a side effect of intrusion.

Occlusal Function

A cuspid-protected, functional occlusion is difficult to achieve with orthodontics, but it is a desirable goal.[10,11] More realistically, it is necessary to reduce the palatal cusp height and rotate the premolar mesially to establish contact with the mandibular cuspid on the mesial ridge of the buccal cusp. Some clinicians fear that canine substitution exposes a premolar to excessive functional loads. Long-term studies of periodontal condition and occlusal function from 2-25 (*mean 9.7*) years after treatment have failed to demonstrate any significant problems.[10] Group function is usually the optimal occlusion pattern for canine substituted premolars.[10-12]

Maxillary	Central Incisor	Lateral Incisor	Canine	1st Premolar	2nd Premolar	1st Molar	2nd Molar
Angulation (mesiodistal)	2˚	7˚	17˚	9˚	5˚	10˚	8˚
Inclination (facioligual)	28˚	26˚	16˚	5˚	6˚	8˚	10˚
Crown Size (Mesiodistal)	8.5	6.5	7.5	7	7	10	9

Adapted from Andrews and Wheeler

Table 2: Angulation, inclination, and crown size

Horizontal Root Fracture

The lateral incisor with a fractured crown (*UL2*) reportedly had a root fracture that was well healed prior to treatment (*Fig. 3*). Horizontal root fractures reflect severe trauma, such as an automobile accident or sports injury.[13] Compared with other dental impact injuries, the incidence is relatively low, ranging from 0.5 to 7%.[14-17] Healing sequelae following horizontal root fracture have been described:[15,18,19]

1. healing with calcified tissue;
2. healing with interproximal connective tissue;
3. healing with interproximal bone and connective tissue
4. interproximal inflammatory tissue without healing

Some case reports describe pulp vitality after spontaneous healing.[14] It is recommended that all teeth with horizontal root fractures be followed for at least 2 years prior to initiating orthodontic movement. A similar corroborating case report was published by Hovland et al.[20]

Premolar Substitution

The most obvious advantage for space closure to achieve premolar substitution is the permanence and biological compatibility of the finished result. However, there may be esthetic and stability problems that require careful detailing throughout orthodontic treatment, as well as finishing to achieve optimal positioning and crown torque.[2,5] Coupling orthodontic substitution with new esthetic techniques and materials can achieve natural tooth shapes, sizes, and gingival contours.[4,8] Securing an optimal occlusion with cuspid guidance or group function is consistent with long-term stability of the orthodontic treatment.[7,8]

Conclusions

Prospective interdisciplinary cooperation between orthodontists and other dental specialists is critical for obtaining and maintaining a high quality outcome for premolar substitution to simulate a canine.

Fig. 15: Facial and intraoral photographs at 3-year follow-up document the current condition of the patient.

References

1. Kokich Jr VO, Kinzer GA. Managing congenitally missing lateral incisors. Part I Canine substitution. J Esthet Restor Dent 2005;17(1):5-10.
2. Balshi TJ. Osseointegration and orthodontics: modern treatment of congenitally missing teeth. Int J Periodontics Restorative Dent 1993;13:6.
3. Sabri R. Management of missing maxillary lateral incisors. J Am Dent Assoc 1999;130(1):80-4.
4. Rosa M, Zachrisson BU. Integrating esthetic dentistry and space closure in patients with missing maxillary lateral incisors. J Clin Orthod 2001;35(4):221-38.
5. Seixas MR, Amarante Costa-Pinto R, Martins de Araújo T. Gingival esthetics: an orthodontic and periodontal approach. Dental Press J Orthod 2012;17(5):190-201.
6. Kokich VG, Nappen D, Shapiro P. Gingival contour and clinical crown length: their effects on the esthetic appearance of maxillary anterior teeth. Am J Orthod Dentofacial Orthop 1984;86:89-94.
7. Kokich VG. Anterior dental esthetics: an orthodontic perspective I crown length. J Esthet Dent 1993;5:19-23.
8. Kokich VG, Spear F. Guidelines for managing the orthodontic-restorative patient. Semin Orthod 1997;3:3-20.

9. Robertsson S, Mohlin B. The congenitally missing upper lateral incisor. A retrospective study of orthodontic space closure versus restorative treatment. Eur J Orthod 2000;22(6):697-710.
10. Nordquist GG, Mcneill RW. Orthodontic vs. restorative treatment of the congenitally absent lateral incisor—long term periodontal and occlusal evaluation. J Periodontol 1975;46(3):139-143.
11. Mcneill RW, Joondeph DR. Congenitally absent maxillary lateral incisors: treatment planning considerations. Angle Orthod 1973;43(1):24-9.
12. Senty EL. The maxillary cuspid and missing lateral incisors: esthetics and occlusion. Angle Orthod 1976;46(4):365-71.
13. Legan JJ, Brown CE, Andres CJ. Unusual fracture of a maxillary second premolar. J Endod 1995;21:285-6.
14. Herwejier J, Torabinejad M, Bakland LK. Healing of horizontal root fractures. J Endod 1992;18:118-22.
15. Andreasen JO, Hjörting-Hansen E. Intraalveolar root fractures radiographic and histologic study of 50 cases. Oral Surg Oral Med Oral Pathol 1967;25:414-26.
16. Andreasen JO. Traumatic injuries of the teeth. 2nd ed. Philadelphia: WB Saunders; 1981. p.119–50.
17. Birch R, Rock WP. The incidence of complications following root fracture in permanent anterior teeth. Br Dent J 1986;160:119-21.
18. Andreasen FM, Andreasen JO, Bayer T. Prognosis of root fractured permanent incisors-prediction of healing modalities. Endod Dent Traumatol 1989;5:11-22.
19. Johnson BR, Jensen MR. Treatment of a horizontal root fracture by vital submergence. Endod Dent Traumatol 1997;13:248-50.
20. Hovland EJ, Dumsha TC, Gutmann JL. Orthodontic movement a horizontal root fractured tooth. Br J Orthod 1983;10:32-3.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 9

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 = 0

ANTERIOR OPEN BITE

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

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 4

OCCLUSION

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

Total = 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)	1	x 1 pts. =	1
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: Protrusive lower lip

Total = 5

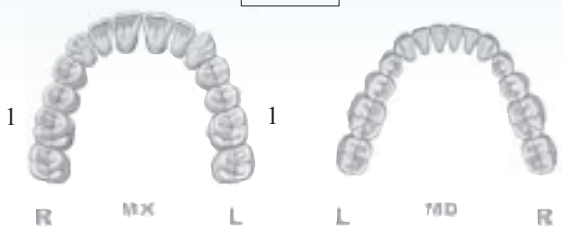
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 14

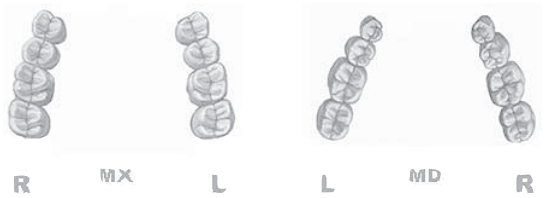
Alignment/Rotations

2



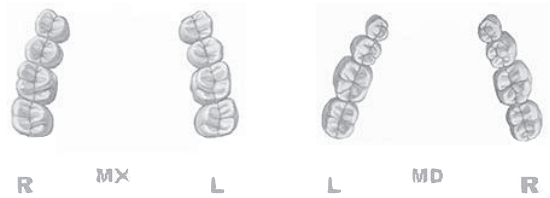
Marginal Ridges

0



Buccolingual Inclination

0

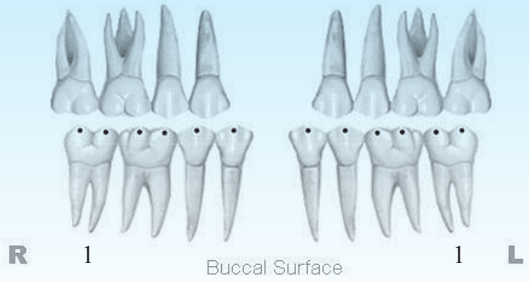


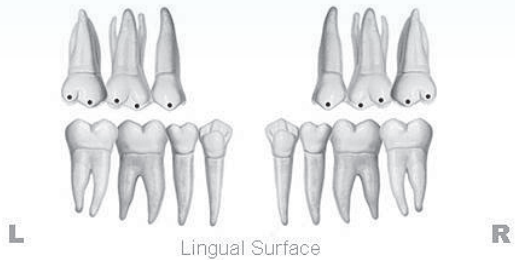
Overjet

4

Occlusal Contacts

2



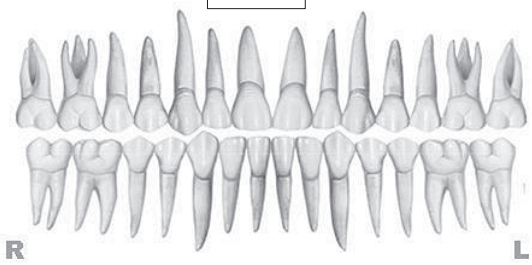


Occlusal Relationships

3

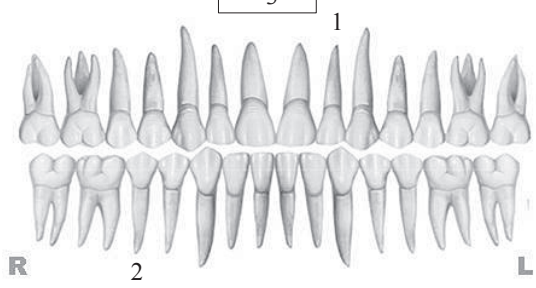
Interproximal Contacts

0



Root Angulation

3



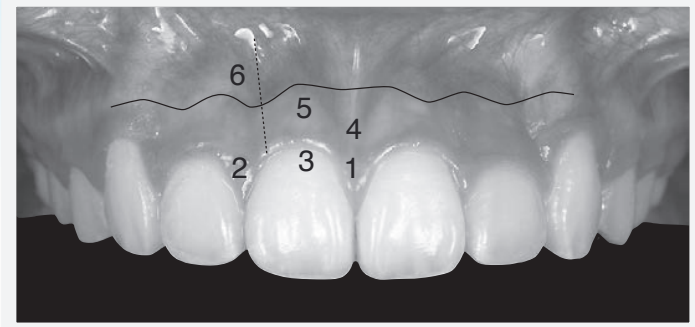
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 5

1. Pink Esthetic Score

Total = 1

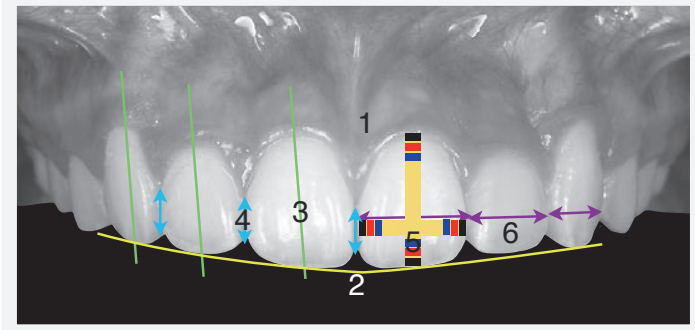


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 4

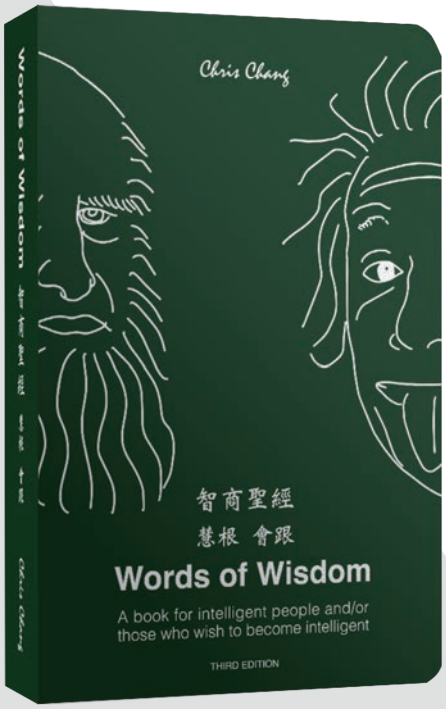


1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2

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

Newton's A

智商聖經



慧根 會跟

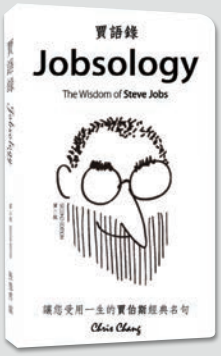
THIRD EDITION

Words of Wisdom

A book for intelligent people and/or those who wish to become intelligent

A classic in your pocket.
Available in Newton's A, Inc.

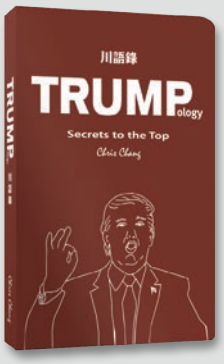
Get it on Apple Books
Chris Chang



Jobsology SECOND EDITION

The Wisdom of Steve Jobs

- *The first collection of Steve Jobs' famous quote, selected by an Apple businessman.*
- *A handy companion for your reading on the go.*



TRUMPology

We owe him (Trump) an open mind and a chance to lead. —Hilary Clinton

- *The other classic created by Dr. Chris Chang,author of the bestseller, Jobsology.*
- *Understand the secrets of Trump's success and improve your English ability simultaneously.*
- *Collected more than 200 famous quotes of the President Trump.*

Now available on Apple Books Store in 51 countries:

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

International Association for Orthodontists & Implantologists

Join the *iAOI* the future of dentistry!

About our association-iAOI

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

How to join iAOI?

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

1. Member

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

2. Board eligible

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

3. Diplomate

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

4. Ambassador

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

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

iAOI Ambassador & Diplomate

國際矯正植牙大使與院士

Ambassadors

Dr. Kenji Ojima◆

Dr. 林詩詠 Joshua Lin*▲

Dr. Diego Peydro Herrero◆

Dr. 張銘珍 Ming-Jen Chang*

Dr. 曾令怡 Linda Tseng*▲

Ambassador（大使）：

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

Diplomates

Dr. 徐玉玲 Lynn Hsu▲

Dr. 李雙安 Angle Lee▲

Dr. 蘇筌瑋 Bill Su

Dr. 葉信吟 Hsin-Yin Yeh▲

Dr. 徐重興 Eric Hsu▲

Dr. 黃育新 Yu-Hsin Huang

Dr. 黃祈 Richie Huang

Dr. 邱上珍 Grace Chiu▲

Dr. 黃瓊嫻 Sabrina Huang

Dr. 曾淑萍 Shu-Ping Tseng

Dr. 林曉鈴 Sheau-Ling Lin

Dr. 張倩瑜 Charlene Chang

Dr. 林佳宏 Alex Lin▲

Dr. 陳俊宏 Chun-Hung Chen

Dr. 林彥君 Lexie Lin▲

Dr. 鄭惠文 Joy Cheng

Dr. 林森田 Chris Lin

Dr. 黃登楷 Kevin Huang

Dr. 張馨文 Sara Chang

Dr. 李名振 Major Lee

Dr. 陳惠華 Judy Chen

Dr. 魏明偉 Ming-Wei Wei

Dr. 黃荷薰 Ashley Huang

Dr. 張銘津 Ariel Chang

Dr. 彭緯綸 Wei-Lun Peng

Dr. 呂詩薇 Julie Lu

Products

Dental Products Essential Kit

NEW

Double Retractors 2.0 Autoclavable!

Double Retractors x2, Black Board x2

While keeping the same lip & cheek two-way design, the new Double Retractors 2.0 is upgraded to medical grade PPSU. This new material is more durable, resilient and most importantly, autoclavable. Its smooth edges and translucent quality make it the best aid to perfect intra-oral photography.

Stainless Steel Mirror

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

Bite Turbo 2.0

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

A simple but power set of tools to correct severe deep bite and cross efficiently. The bite turbos and lingual button molds, made with silicon and filled with flowable resin, can be reused and adjusted depending on treatment progress. The longer one allows you to solve all kinds of deep bite and large horizontal overjet.

2021 一年一度 預報享優惠價 Damon Master Program


+


全新改版的 2021 貝多芬高效 Damon 矯正大師系列課程，是由**國際知名講師張慧男醫師親自規劃及授課**，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧，本年度亦特別加入最新的**數位矯正與隱形牙套**的內容，並邀請了貝多芬牙科集團各院院長演講**特別矯正專題**。

此外，透過數位影片反覆觀看，結合矯正與電腦教學，課堂助教協助操作，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。

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

Module 1 - 4/22 (A班) | 5/20 (B班*)

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

Practice: Clinical photography

Module 2 - 5/13 (A班) | 6/3 (B班)

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

Practice: Patient photo management

Module 3 - 5/27 (A班) | 6/24 (B班)

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

Practice: Ceph tracing

Module 4 - 6/17 (A班) | 7/29 (B班)

1. Excellent finishing
2. Retention & relapse

Practice: Ceph superimposition & measurement

Module 5 - 7/8 (A班) | 8/12 (B班)

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

Practice: Case report demo

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

＊B班為**特別加開班**

Module 6 - 8/5 (A班) | 9/30 (B班)

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment (曾淑萍醫師)

Module 7 - 9/9 (A班) | 10/14 (B班)

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

Topic: Modfied VISTA (蘇筌瑋醫師)

Module 8 - 9/16 (A班) | 11/4 (B班)

1. ABO DI, CRE workshop
2. Open bite

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

Module 9 - 10/21 (A班) | 11/25 (B班)

1. Asymmetry
2. Implant-ortho combined treatment
3. Interdisciplinary treatment-adult complex cases

Topic: Interdisciplinary approach (邱上珍醫師)

Module 10 - 11/11 (A班) | 12/9 (B班)

1. Minor surgeries in orthodontics
2. Digital orthodontics

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

Module 11 - 12/23 (A班) | 12/30 (B班)

1. Aligner & TADs
2. Keys to aligner learning

Topic: Pre-aligner treatment (林詩詠醫師)

▲ **Special lecture: 1:30-2:30 pm**

時間：週四全天（9 am - 5 pm）
地點：金牛頓藝術科技（新竹市建中一路 25 號 2 樓）
費用含課程視訊、iPad、課程電子書與材料。

LINE@ 官方帳號

Facebook 官方帳號

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

Severe Class III Open Bite Malocclusion: Conservative Correction with Lower First Molar Extraction

Abstract

***History**: A 29-year-old male presented with a severe Class III openbite malocclusion. His chief complaint was poor masticatory function.*

***Diagnosis & Etiology**: An increased vertical dimension of occlusion (58%) was associated with flat mandible plane (26˚), openbite (4mm), and negative overjet (-9mm), but there was no functional shift from centric relation (C_R), to maximal intercuspation (centric occlusion, C_O). The dental midline was 2mm to the right of the facial midline. The probable etiology for this severe skeletal malocclusion was a genetic tendency for prognathism (ANB -9˚) that was associated with airway obstruction in the juvenile years. Applying Lin's three-ring diagnosis in C_R, facial profile was concave (G-Sn-Pg' -14˚), molar relationship was Class III (>10 mm), and there was no functional shift. The patient was not an ideal candidate for conservative orthodontic correction, but he declined orthognathic surgery and preferred to avoid temporary anchorage devices (TADs). The lower left first molar (LL6) was compromised so he agreed to extracting both lower first molars (L6s) to maintain symmetry, and close space with primarily Class III elastics. The Discrepancy Index (DI) was 100.*

***Treatment**: Bilateral L6s were removed to produce posterior space for retraction of the lower anterior segment to correct the anterior crossbite. A passive self-ligating (PSL) appliance was bonded on the dentition with high torque brackets on lower incisors and low torque brackets on upper incisors. Axial inclination for the lower anterior was controlled with progressive pre-torqued NiTi and stainless archwires with 15˚ of lingual root torque to compensate for lingual tipping, which is a side effect of Class III elastics.*

***Outcome**: Following 26 months of active treatment, this difficult malocclusion, with a DI=100, was treated to a Cast-Radiograph Evaluation (CRE) score of 29 points and a Pink and White esthetic score of 4 points.*

***Conclusions**: Conservative orthodontic treatment for severe skeletal Class III malocclusion is challenging and may not achieve an ideal outcome. The patient must be informed of potential risk, provide informed consent, and be very cooperative during treatment. Both the clinician and the patient were pleased with the outcome. (J Digital Orthod 2021;61:50-66)*

Key words:
Skeletal Class III pattern, Class III molar relationship, Class III intermaxillary elastics, first molar extraction

Introduction

The dental nomenclature for this case report is a modified Palmer notation. The quadrants are upper right (*UR*), upper left (*UL*), lower right (*LR*), and lower left (*LL*). Relative to the midline, permanent teeth in each quadrant are numbered from 1 to 8, and deciduous teeth are a-e. For example, an upper right first premolar is UR4, and lower right second deciduous molar is LRe.

The prevalence of Angle Class III malocclusion usually varies from 1% to >10% worldwide, but this anomaly is most common among Asians. Chinese and Malaysian populations have a high prevalence of Angle Class III malocclusion, 15.69% and 16.59%, respectively. In the United States, the prevalence of Class III malocclusion is only about 1% of the total population, but about 5% of all orthodontic patients are Class III.[1]

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

Generally speaking, Class III malocclusion can be corrected with orthodontics via camouflage treatment, TAD anchorage, and/or orthognathic surgery. The majority of patients in Taiwan decline orthognathic surgery because of morbidity, potential complications, and expense.[2] TAD anchorage with fixed appliances is usually preferred,[3] but some patients also decline TADs. For the latter group, even conservative correction with extractions is very challenging.

This article presents a severe skeletal Class III malocclusion which was best treated with orthognathic surgery to achieve an idea result.

Fig. 1: Pre-treatment facial and intraoral photographs

However, the patient was not concerned about facial esthetics, so he declined orthognathic surgery and TADs. He was only interested in having his occlusion corrected with camouflage treatment and extractions.

Diagnosis and Etiology

The principal concern for the present patient was the inability to bite and chew with his front teeth. Medical and dental histories were non-contributory. The facial profile was concave (*G-Sn-Pg' -14˚*) with a retrusive upper lip (*-4mm to the E-Line*) and a protrusive lower lip (*3mm to the E-Line*). Compared to the facial midline, the upper and lower dental midlines were 2 and 3mm to the right, respectively (*Fig. 1*). Plaster casts revealed severe Class III canine and molar relationships (*>10mm*) bilaterally with an openbite of 4mm (*Fig. 2*). Temporomandibular joint (*TMJ*) morphology was normal in the open and closed positions (*Fig. 3*). There were no signs or symptoms of temporomandibular dysfunction (*TMD*).

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

The cephalometric evaluation (*Table 1*) revealed decreased facial convexity (*G-Sn-Pg -13˚*) and a prognathic mandible (*SNA 89˚, SNB 98˚, ANB -9˚*). The mandibular plane angle was flat (*SN-MP 26˚, FMA 19˚*), the angle of the lower incisors (*88.5˚*) was

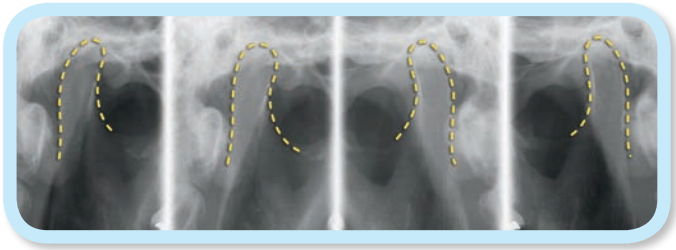


Fig. 3: Transcranial radiographs of the temporomandibular joints (TMJs) prior to treatment are shown from the left: Right TMJ closed, Right TMJ open, Left TMJ open, and Left TMJ closed.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA˚ (82°)	89˚	91˚	2˚
SNB˚ (80°)	98˚	96˚	2˚
ANB˚ (2°)	-9˚	-5˚	4˚
SN-MP˚ (32°)	26˚	25˚	1˚
FMA˚ (27°)	19˚	18˚	1˚
DENTAL ANALYSIS			
U1 To NAmm (4mm)	9	12	3
U1 To SN˚ (104°)	128˚	130˚	2˚
L1 To NBmm (4mm)	9	1	8
L1 To MP˚ (90°)	88.5˚	66.5˚	22˚
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-4	-4	0
E-LINE LL (0mm)	3	-1.5	4.5
%FH: Na-ANS-Gn (56%)	58%	59%	1%
Convexity: G-Sn-Pg' (13°)	-14˚	-13˚	1˚

Table 1: Cephalometric summary

within normal limits (*WNL*), but the upper incisors had an increased axial inclination (*128˚*) (*Fig. 4*). The panoramic radiograph reveals that LL6 had a crown with failed root canal therapy (*Fig. 5*). All four wisdom teeth were erupted and reasonably well aligned. The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 100 as shown in the subsequent worksheet. The most significant problems were the anterior crossbite (*50 points*), anterior open bite (*17 points*), and occlusion discrepancy (*17 points*).

Treatment Objectives

(1) Correct the functional occlusion with dental compensation as needed.

(2) Achieve Class I canine and molar relationships.

(3) Close the openbite.

(4) Improve facial esthetics.

(5) Correct the midline discrepancy.

Fig. 4: Pre-treatment cephalometric radiograph

Fig. 5: Pre-treatment panoramic radiograph

Treatment Alternatives

Option 1: the most ideal correction was with orthognathic surgery because of the large sagittal discrepancy (*ANB -9˚*), negative overjet (*9mm*), and openbite (*4mm*).

Option 2: conservative, camouflage approach involving bilateral extraction of the lower 6s, and retraction of the lower arch with mandibular buccal shelf bone screws (*TAD*) anchorage and Class III elastics.[4]

Option 3: similar camouflage approach as option 2 but without TAD anchorage.

The patient was a medical doctor. He well understood the risks of surgery[5] and was strongly opposed to orthognathic surgery (*Option 1*). He also preferred to avoid TADs so he chose Option 3. It was explained that this conservative orthodontic approach was very challenging and the outcomes were unpredictable. There may be problems with incisal inclination, and the chin may appear more prominent after treatment. It was also necessary to extract the U8s because they would not be in occlusion after treatment. After a thorough

discussion of the pros and cons for each approach, the patient still preferred the last option and provided informed consent for treatment.

Treatment Progress

A 0.022-in Damon Q® (*Ormco, Brea, CA*) passive self-ligating (*PSL*) fixed appliance was selected. After removing U8s and both L6s, low torque brackets were bonded upside down on the lower incisors to achieve increased root-lingual torque, and high torque brackets were placed on the lower canines. The brackets were intentionally bonded more gingivally to help resolve the openbite. The initial archwire was 0.014-in copper-nickel-titanium (*Table 2*).

One month later, the maxillary arch was bonded with the same PSL appliance; central incisors and canines were bonded with low torque brackets. The initial archwire was 0.014-in copper-nickel-titanium. Early light short Class III elastics (*Quail, 3/16-in, 2-oz; Ormco*) were used from U6s to L4s to correct the sagittal discrepancy.

In the following months, the sequences for the upper archwire were 0.018-in CuNiTi, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA. In the third and fourth months, the sequence for the lower archwire was 0.014x0.025-in CuNiTi and 0.017x0.025-in TMA. In the sixth month, the maxillary and mandibular archwires were changed to 0.016x0.025-in SS and

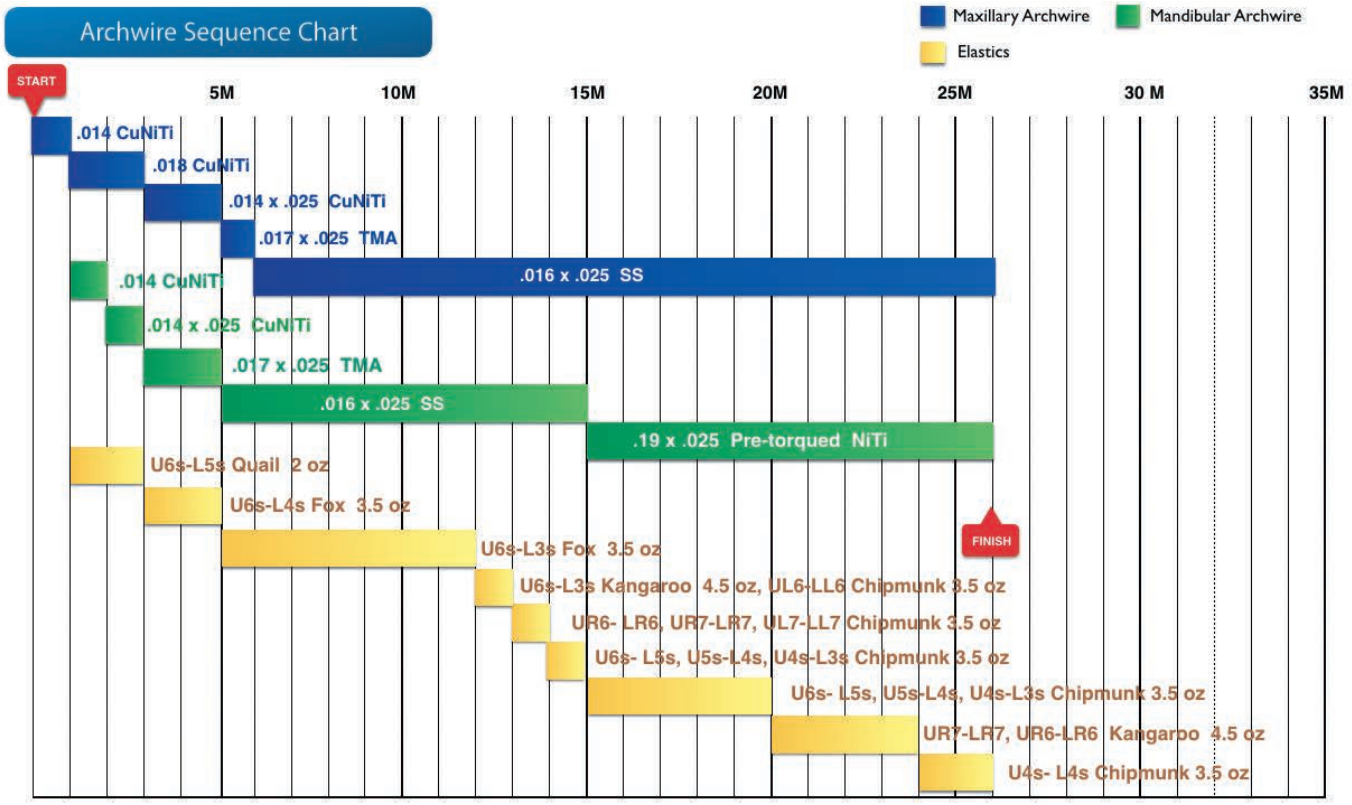


Table. 2: Archwire sequence chart

0.016x0.025-in SS with 15˚ of lingual root torque respectively. Short Class III elastics were changed to long Class III elastics (*Fox,1/4-in, 3.5-oz; Ormco*) from the U6s and U7s to the L3s to improve the sagittal discrepancy. Buttons were bonded on the L4s and L8s to attach power chains (*Table 2*).

In the tenth month, the openbite was closed and there was incisal interference. Anterior bite turbos were bonded on the lower incisors to help correct the anterior crossbite. Positive overjet was noted in the 12th month, so the anterior bite turbos were removed. In the 14th month, short Class III elastics were applied (*Chipmunk, 1/8-in, 3.5-oz; Ormco*) from U6 to L5, U5 to L4, and U4 to L3.

In the 15th month, the extraction spaces were closed. In the 19th month, the positive overjet of 2mm was persistent. Lingual torque in the anterior portion of the lower archwire and short Class II elastics (*Chipmunk,1/8-in, 3.5-oz; Ormco*) were applied from L6 to U5, L5 to U4, and L4 to U3.

Treatment progress is documented in a progressive series of intraoral photographs in the following frontal (*Fig. 6*), right buccal (*Fig. 7*), left buccal (*Fig. 8*), maxillary occlusal (*Fig. 9*), and mandibular occlusal (*Fig. 10*) views. After 26 months of orthodontic treatment, fixed appliances were removed. Maxillary and mandibular clear overlay retainers were delivered to wear full-time for the first six months and nights only thereafter. A fixed retainer was bonded from the lower second premolars to the lower second molars to prevent the reopening of the L6 extraction sites.

Treatment Results

The facial profile was improved, and the facial esthetics were more harmonious, but the chin appeared more protrusive. A near ideal dental alignment was achieved, including normal overbite and overjet with bilateral Class I buccal segments. The anterior crossbite and open bite were both corrected, resulting in a pleasant smile arc with a more youthful facial appearance (*Figs. 11 and 12*).

Fig. 6:
Frontal views of the treatment sequence is shown at treatment times in months: 1M, 3M, 6M, 9M, 12M, 15M,19M, and 22M in a clockwise order.

Fig. 7:
Right views of the treatment sequence is shown at treatment times in months: 1M, 3M, 6M, 9M, 12M, 15M,19M, and 22M in a clockwise order.

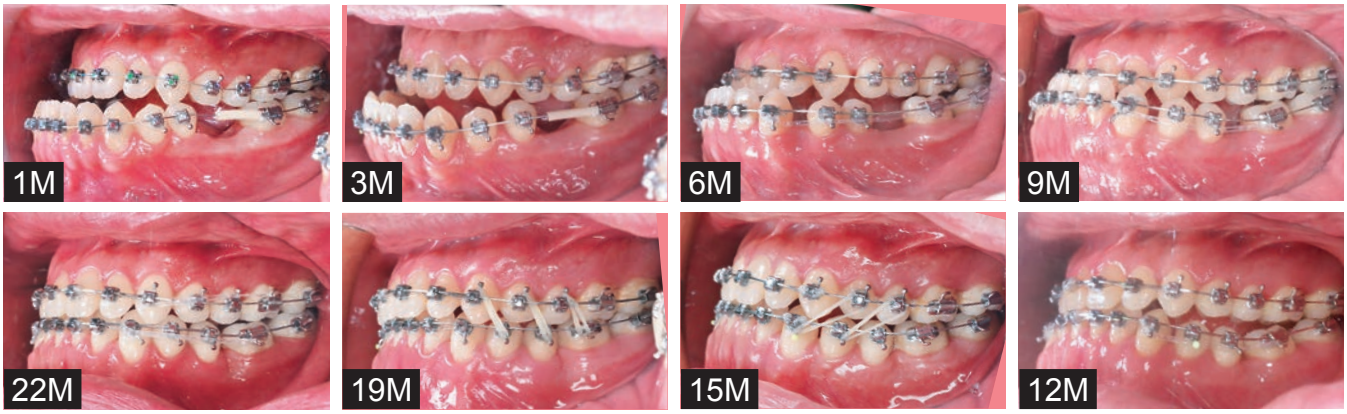


Fig. 8:
Left views of the treatment sequence is shown at treatment times in months: 1M, 3M, 6M, 9M, 12M, 15M,19M, and 22M in a clockwise order.

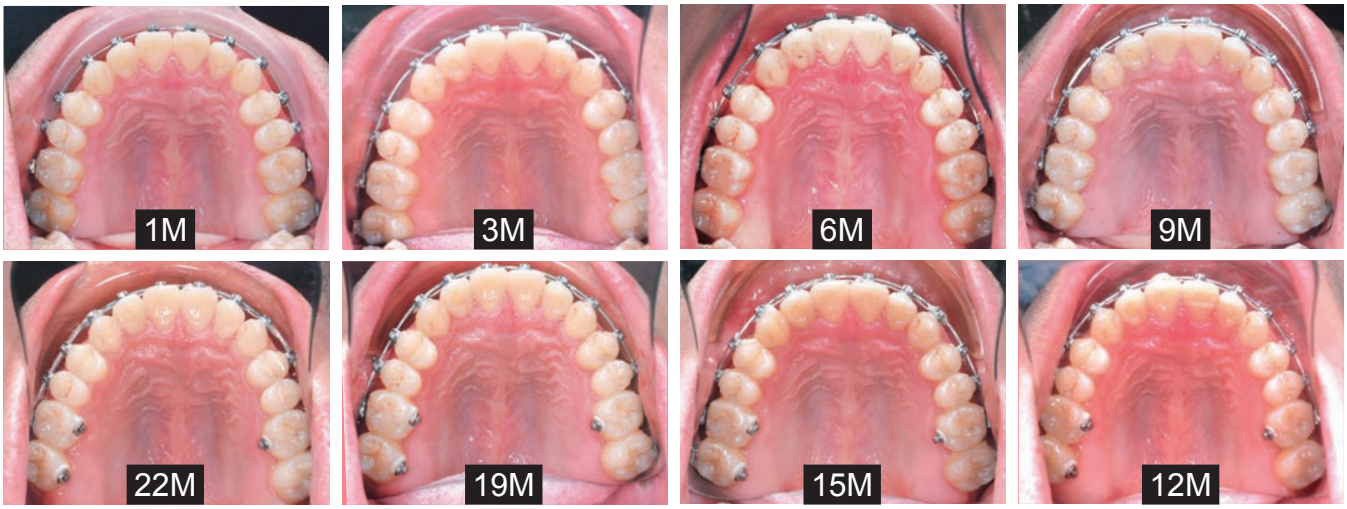


Fig. 9: The progress of the upper arch is shown at treatment times in months: 1M, 3M, 6M, 9M, 12M, 15M,19M, and 22M in a clockwise order.

Fig. 10: The progress of the lower arch is shown at treatment times in months: 1M, 3M, 6M, 9M, 12M, 15M,19M, and 22M in a clockwise order.

Fig. 11: Post-treatment facial and intraoral photographs

Except for tipping of the L5s and L7s, the post-treatment panoramic radiograph documented adequate root alignment (*Fig. 13*). Superimposed cephalometric tracings revealed an increased axial inclination of the maxillary incisors (*130°*) and a decreased axial inclination of the mandibular incisors (*66.5°*). Furthermore, the lower incisors and lip were retracted. In addition to the counterclockwise rotation of the lower arch, the face appeared less prognathic because the mandible was rotated clockwise (*Figs. 14 and 15*). The ABO Cast-Radiograph Evaluation (*CRE*) score was 29 points (*Worksheet 2*). The major CRE discrepancies were alignment (*5 points*), marginal ridges (*5 points*), bucco-lingual inclination (*5 points*), and overjet (*5 points*). Pink and White dental esthetic score was 4.

Fig. 12: Post-treatment study models (casts)

Fig. 13: Post-treatment panoramic radiograph

Discussion

Considerations when planning and treating Class III malocclusions

Three different therapeutic approaches were considered for the orthodontic treatment of this Class III malocclusion: orthognathic surgery, TADs, and extractions. The 3-Ring Diagnosis, developed by Dr. John Lin, is an effective method for diagnosing Class III malocclusions that are amenable to conservative therapy.[2] There are three favorable indicators when evaluated in C_R: 1. orthognathic profile (*acceptable facial balance*), 2. buccal segments that are approximately Class I, and 3. a functional shift to C_O. The present patient fit none of these criteria, so conservative treatment was very challenging. However, he did have other favorable factors: a deceased mandibular plane angle and only a moderate open bite (*Fig. 16*).[3,4] Because of the concave profile (*convexity: G-Sn-Pg-13°*) and bilateral >10mm Class III relationship of the buccal segments, mandibular set-back surgery was clearly indicated. However, the patient declined that option because facial esthetics were not an important consideration. Furthermore, he was concerned about surgical complications such as nerve injury (*50%*), temporomandibular disorder (*TMD*) (*14%*),

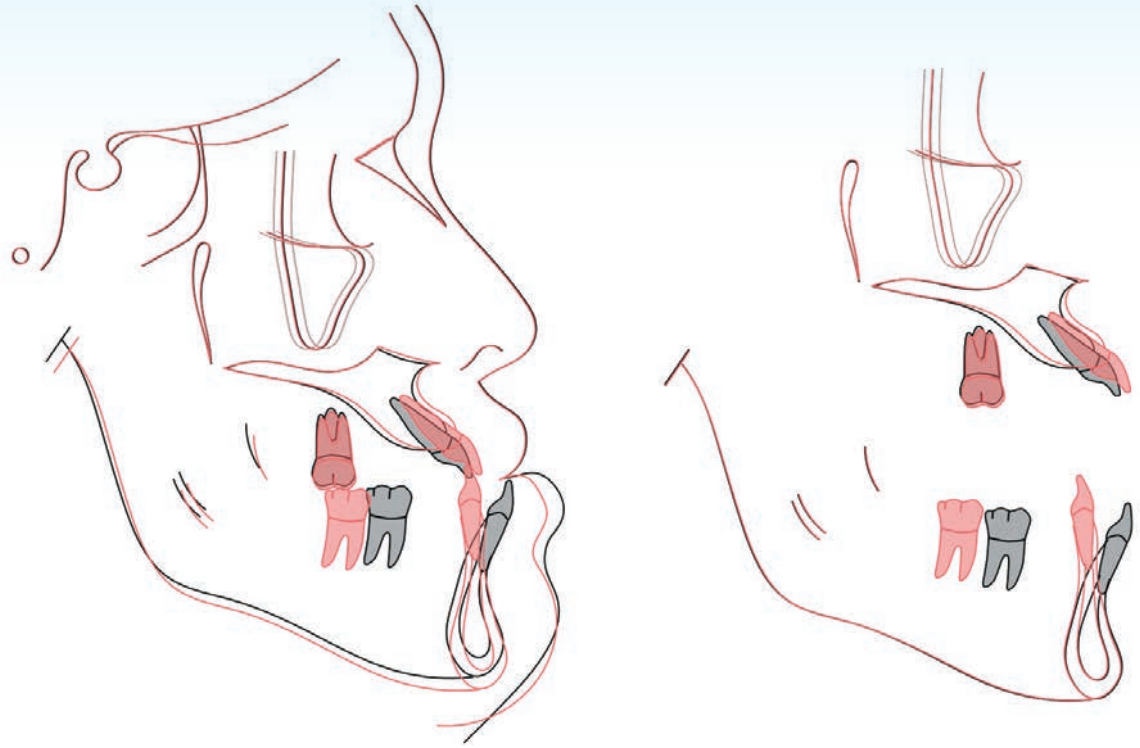


Fig15:
Superimposed tracings of the initial (black) and final (red) cephalometric films reveal the skeletal and dental changes that occurred during treatment. After treatment, 10mm lingual retraction of the lower incisors was noted.

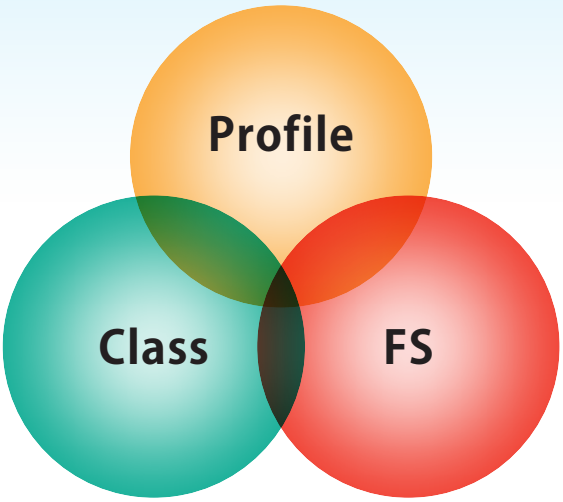
hemorrhage (9%), hearing problems (7%), infections (7%), and relapse (4%).[4] Avoiding orthognathic surgery usually requires the use of intermaxillary Class III elastics, extractions, and/or TAD anchorage to achieve dental compensation.[5]

(1) Class III Elastics

Orthodontic compensation with or without extractions usually involves intermaxillary Class III elastics. The whole maxillary dentition acts as anchorage to retract the mandibular arch.[6] The usage of Class III elastics protracts the upper arch, retracts the lower arch, tips upper incisors labially, and tips lower incisors lingually.[7] To counteract the adverse effects of Class III elastics, resistant anterior moments in the brackets and archwires are required.[6]

(2) Extraction

In camouflage treatments, extraction spaces can be used to produce dental compensation for the jaw discrepancy. Space management, crowding and spaces, are important considerations for planning extractions which are usually premolars or molars.[6]



Profile: Orthognathic profile at C_R position
Class: Canine and molar classification
FS: Functional shift ($C_O \neq C_R$)

Fig. 16:
Lin's Class III diagnostic system evaluates facial profile and molar classification in C_R, as well as the functional shift from C_R to C_O. If the profile is acceptable in C_R, the molars are in or near Class I, and there is a significant functional shift, the patient can usually be effectively managed with conservative camouflage treatment.

Extraction of upper second premolars and lower first premolars

This is a common approach for resolving moderate to severe crowding in the lower arch when there is little or no crowding in the maxillary arch.[8]

Extraction of lower first premolars

When the upper arch is well aligned or can be corrected with dental expansion, extraction of only the lower first premolars is useful for resolving crowding and retracting the mandibular incisors.[8]

Extraction of molars

The extraction of four premolars may fail to provide adequate space to resolve severe Class III malocclusion. Extraction of a compromised molar is indicated rather than removing a sound premolar, but the large asymmetric space is problematic for orthodontic space closure. Removal of the contralateral molar may be indicated to achieve symmetry. Bilateral extraction of molars may be a good option if the upper and lower arches are well aligned, or when the lower crowding is modest. Molar extraction must be approached carefully in growing patients because lack of posterior stops in occlusion may handicap the development of the mandible.[6]

Extraction of a molar is not usually advantageous for relieving crowding in the lower anterior segments, but it provides more space (*10-11mm*) for retraction of the anterior segment compared with extraction of a premolar (*7mm*). The treatment time for a molar extraction approach is expected to increase treatment time 6-8 months.[9,10]

Which molar should then be extracted? Evaluation of mandibular molar health is imperative, because these teeth are a major aspects of functional occlusion.[9] Molars compromised with fractured cusps, extensive caries, hyperplastic lesions, apical pathology, or extensive restorations may be good candidates for extraction.[6]

(i) Third Molar

If a third molar is missing and the space required is minimal, mandibular buccal shelf bone screws are effective for retracting the entire lower arch. The TADs are also useful for Class II elastics to control the labial tipping of the upper anterior segment caused by Class III elastics. This approach is only useful for correcting anterior crossbite with the use of TAD anchorage preferably in the mandibular buccal shelf.[10]

(ii) Second Molar

If the third molars are present, second molar extraction is effective for correction of anterior crossbite.[11] However, severe malocclusions may require the anchorage of mandibular buccal shelf bone screws. The advantages of these mechanics are a more anterior position of the extraction space in the arch which facilitates first molar retraction to close the space. This approach also avoids complications for the surgical removal of third molars. They can be uprighted, and closure of the second molar space is a relatively simple process. [8]

(iii) First Molar

If the mandibular second and third molars are present, extraction of first molars is effective for creating a large space (*10-11mm*) to manage sagittal and vertical problems to achieve Class I molar relationship.[12] Extraction of first molars may be capable of correcting anterior crossbite without the use of TADs, particularly if cooperation is good with Class III elastics (*Fig. 15; Table 2*). The disadvantages for this approach are that it is time-consuming, and that mandibular second molars have a tendency to tip mesially and lingually, requiring additional orthodontic mechanics.[9] Among the three extraction options, mandibular first molars offer the greatest potential. Hence, high torque brackets were indicated for the lower incisors because it would result in the greatest retroclination.

(3) Placement of TADs

With bone screw anchorage, dental discrepancies can be effectively treated within the limits of the skeletal support. Compared to Class III elastics, the osseous anchorage of TADs helps to avoid excessive upper incisor proclination, which results in a more acute nasolabial angle.[13] On the contrary, TAD anchorage contributes to retraction of the lips which makes the chin appear more prominent. Since camouflage treatment aligns the dentition on a compromised skeletal base, it is difficult to achieve desirable dentofacial esthetics. The current patient was informed about the deficiencies of camouflage treatment, but he still insisted on orthodontics with only extraction of L6s.

Integrating this knowledge into the present case

To achieve Class I molar relationship, an 11mm space was required bilaterally. The LL6 had extensive periapical pathology so it was a candidate for extraction. To create a similar contralateral space, it was necessary to extract the LR6 also. In the absence of TAD anchorage, Class III elastics were critical for correction of the crossbite. Short Class III elastics

(*U6s to L5s*) were applied from the beginning of the treatment. When the wire was changed to 0.016x0.025-in SS, then long Class III elastics (*U6s and U7s to L4s*) were used.

With these mechanics, lingual tipping of the lower incisors was expected, so upside-down low torque brackets were used to deliver a high root lingual torque. An additional 15˚ of lingual root torque was delivered with the sequence of lower archwires (*Table 2*).

To prevent mesial tipping of L7s, rectangular archwires (*0.016x0.025-in SS*) were used for space closure with minimal tipping in the sagittal and frontal planes.[9] Power chains were attached to the buttons bonded on the L4s and L8s to balance buccal and lingual space closure force.[14,15]

In the sixth month, the openbite was closed, resulting in incisal interface that inhibited the correction of the anterior crossbite. Anterior bite turbos were bonded on the lower four incisors at 10 months (*10M*) (*Fig. 6: 9M and 12M*). After 1 month, the crossbite was corrected to a positive overjet, and the turbos were removed.

In the 15th month, the extraction spaces were closed (*Fig. 10*), so the remainder of active treatment focused on completing the buccal correction and settling the occlusion. Bilateral Class III intermaxillary elastics were used (*U6-L5, U5-L4, and U4-L3*). The cooperation of the patient with the elastics was excellent, and TADs were not necessary. In the 19th month, a 2mm positive overjet was noted, so short Class II elastics (*L6-U5, L5-U4, L4-U3*) were prescribed (*Fig. 7: 15M and 19M*). However, the 2mm positive overjet was not a problem because it was regarded as an overcorrection.

After the orthodontic closure of the extraction sites, it is common to find interdental gingival clefts which may favor reopening of the space.[16] Surgical removal of clefts may be necessary to maintain the outcome as well as to preserve periodontal health.[9] No periodontal surgery was performed but a splinting wire was bonded between the lower second premolars and second molars to prevent relapse.

Conclusions

Severe skeletal Class III malocclusion is typically an orthognathic surgical problem. However, with excellent patient compliance, bilateral extraction of lower first molar, and extensive use of Class III elastics, severe skeletal Class III malocclusion can be treated to an optimal result without orthognathic surgery nor TADs.

References

1. Jaradat M. An Overview of Class III malocclusion (prevalence, etiology and management). J Adv Med Med Res 2018;25(7): 1–13.
2. Lin JJ. Creative orthodontics blending the Damon System & TADs to manage difficult malocclusion. 2nd ed. Taipei, Taiwan: Yong Chieh; 2010. p. 263-71.
3. Tseng LL, Chang CH, Roberts WE. Diagnosis and conservative treatment of skeletal Class III malocclusion with anterior crossbite and asymmetric maxillary crowding. Am J Orthod Dentofacial Orthop 2016;149(4):555–66.
4. Chen HH, Chang CH, Roberts WE. Oligodontia and Class II malocclusion treated with orthodontics, bone augmentation, and an implant-supported prosthesis. Int J Orthod Implant 2014;36:52–69.
5. Jędrzejewski M, Smektała T, Sporniak-Tutak K, Olszewski R. Preoperative, intraoperative, and postoperative complications in orthognathic surgery: a systematic review. Clin Ora l Investig 2015;19(5):969–77.
6. Hu H, Chen J, Guo J, Li F, Liu Z, He S, Zou S. Distalization of the mandibular dentition of an adult with a skeletal Class III malocclusion. Am J Orthod Dentofac. Orthop 2012;142(6):854–62.

Fig.17: Facial and intraoral photographs 2 years post-treatment document the current condition of the patient.

7. Ferreira FPC, Goulart M da S, de Almeida-Pedrin RR, Conti AC de CF, Cardoso M de A. Treatment of Class III malocclusion: atypical extraction protocol. Case Rep Dent 2017, Article ID 4652685, 9 pages
8. Akhoon AB, Mushtaq M, Ishaq A Borderline Class III patient and treatment options: A comprehensive review. Int J Med Heal Res 2018;4(2):14–6.
9. Ruellas AC, Baratieri C, Roma MB, Izquierdo Ade M, Boaventura L, Rodrigues CS, Telles V. Angle Class III malocclusion treated with mandibular first molar extractions. Am J Orthod Dentofac Orthop 2012;142(3):384–92.
10. Yeh HY, Lin JJ, Roberts WE Conservative adult treatment for severe Class lll, openbite malocclusion with bimaxillary crowding. Int J Orthod Implantol 2014;34:12–23.
11. Lin J, Gu Y. Lower second molar extraction in correction of severe skeletal Class III malocclusion. Angle Orthod 2006;76(2):217–25.
12. Tomonari H, Yagi T, Kuninori T, Ikemori T, Miyawaki S. Replacement of a first molar and 3 second molars by the mesial inclination of 4 impacted third molars in an adult with a Class II Division 1 malocclusion. Am J Orthod Dentofac Orthop 2015;147(6):755–65.
13. Huang S, Chang CH, Roberts WE. A severe skeletal Class III open bite malocclusion treated with nonsurgical approach. Int J Orthod Implantol 2011;24:28–39.
14. Cheng J, Lee A, Chang CH, Roberts WE. Skeletal Class ll malocclusion with convex profile, horizontal impaction and gummy smile: substituting third for second molars. J Digit Orthod 2018;52:50–66.
15. Lin SL, Chang CH, Roberts WE. Uprighting and protracting a horizontally impacted lower third molar in an adult. Int J Orthod Implantol 2014;34:58–77.
16. Rivera Circuns AL, Tulloch JF. Gingival invagination in extraction sites of orthodontic patients: their incidence, effects on periodontal health, and orthodontic treatment. Am J Orthod 1983;83(6):469–76.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 100

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 = 50

OVERBITE

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

Total = 0

ANTERIOR OPEN BITE

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

Total = 17

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 0

OCCLUSION

Class I to end on = 0 pts.
End on Class II or III = 2 pts. per side ____ pts.
Full Class II or III = 4 pts. per side 8 pts.
Beyond Class II or III = 1 pt. per mm. additional 9 pts.

Total = 17

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 4

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 7 x 1 pt. = 7

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 = 12

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 _____ x 2 pts. = _____

Identify:

Total = 0

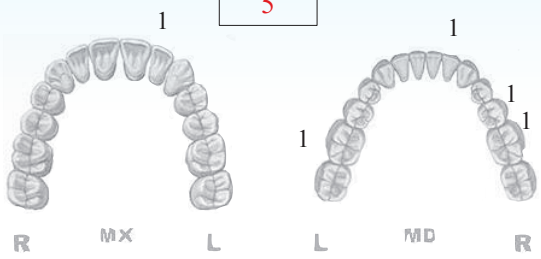
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 29

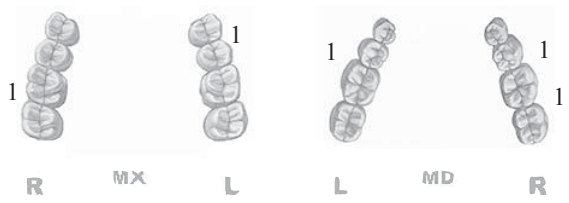
Alignment/Rotations

5



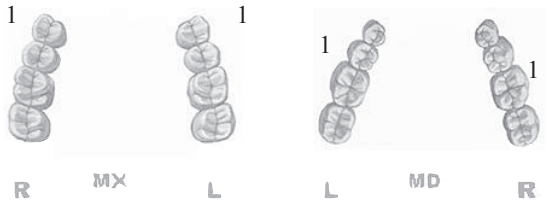
Marginal Ridges

5



Buccolingual Inclination

4

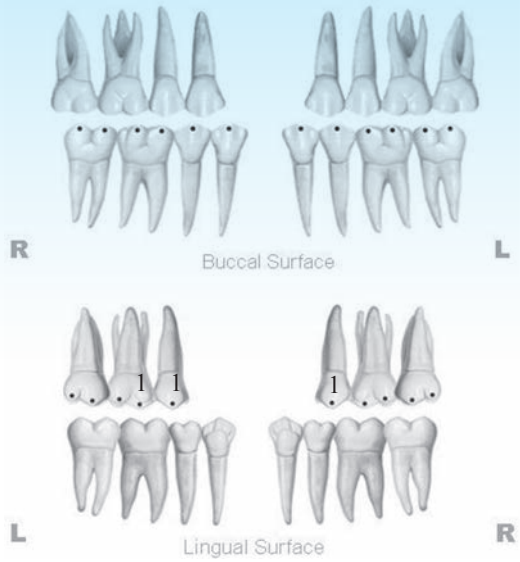


Overjet

5

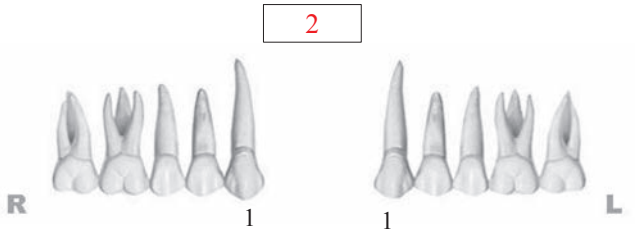
Occlusal Contacts

3



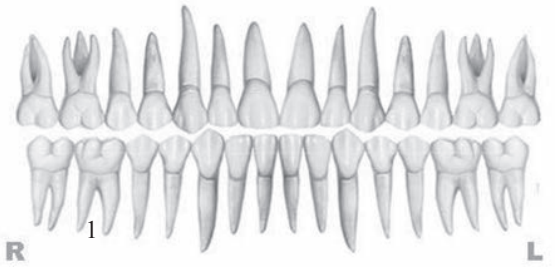
Occlusal Relationships

2



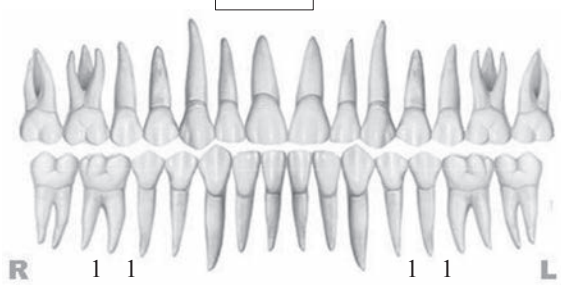
Interproximal Contacts

1



Root Angulation

4



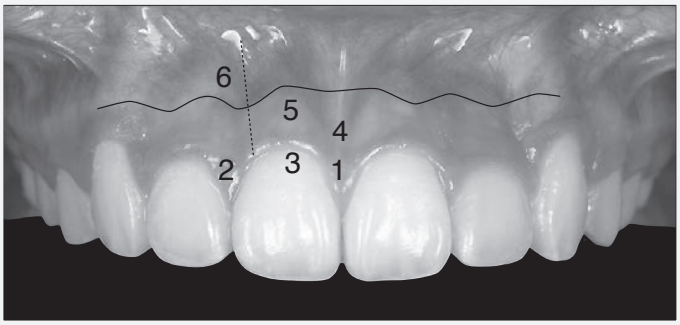
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 4

1. Pink Esthetic Score

Total = 0

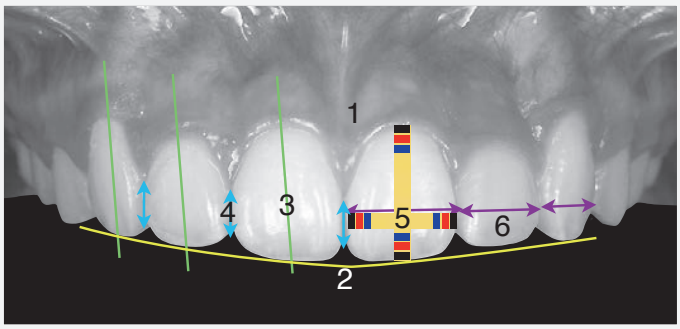


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

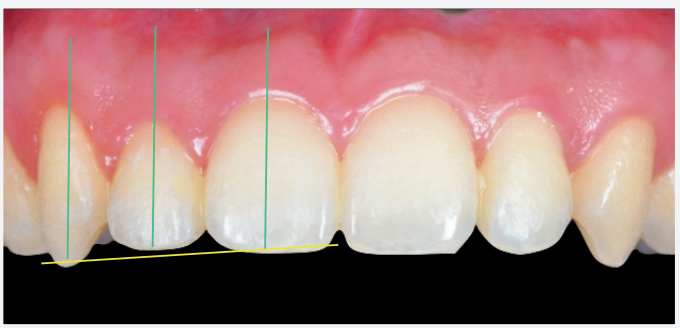
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

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

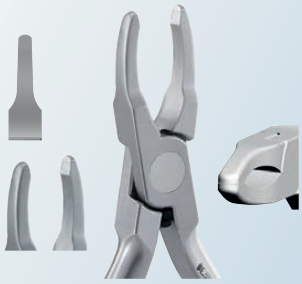
德 國 精 湛 工 藝

carl martin Solingen

隱形矯正必備 Clear Aligner

OLS-1510
1.5mm Point Elevation

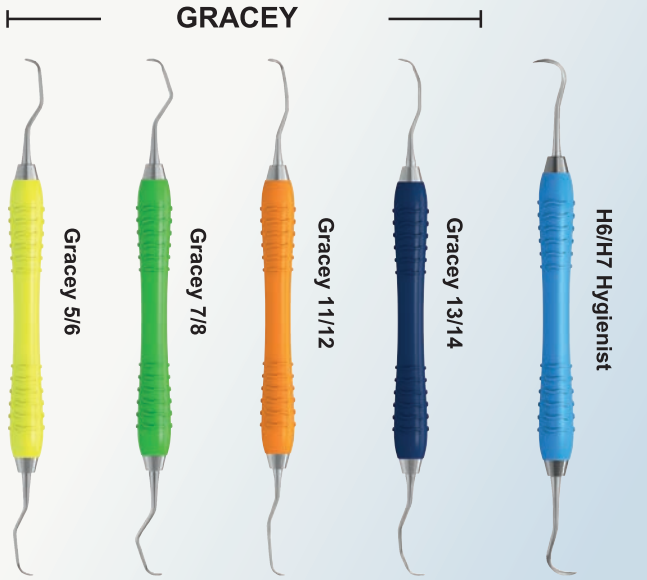
OLS-1520
Reverse



蔡士棹醫師
強力推薦

特價 NT$3,720/支

德製牙周特惠組 SI-Paro-Set1



限量60盒 整組販售，恕不拆換

特價 NT$3,500/盒

隱形矯正必備套組 Clear Collection

HuFriedyGroup
The Best In Practice

678-800
The Tear Drop

特價 NT$4,830/支

678-801
The Vertical

特價 NT$4,340/支

678-802
The Horizontal

特價 NT$4,340/支

678-803
The Hole Punch

特價 NT$4,830/支

蔡士棹醫師
強力推薦

Clenchy™

任購買4支器械，贈送矯正隱形牙套咬條4條

· 衛部醫器輸壹字第015200、016599、020910號

your best dental supplier YONG CHIEH 湧 傑 客服專線：北區 (02)2778-8315 · 中區 (04)2305-8915 · 南區 (07)226-0030

RECOMMEND

熱銷器械

HuFriedyGroup
The Best In Practice

1

SP20

20 CORN SUTURE, 15CM

特價NT$2,310/支

2

PFIWDS1MK

URBAN TUNNELING "MINI ME"

特價NT$980/支

3

PPAEL

ALLEN

特價NT$2,100/支

4

KPA

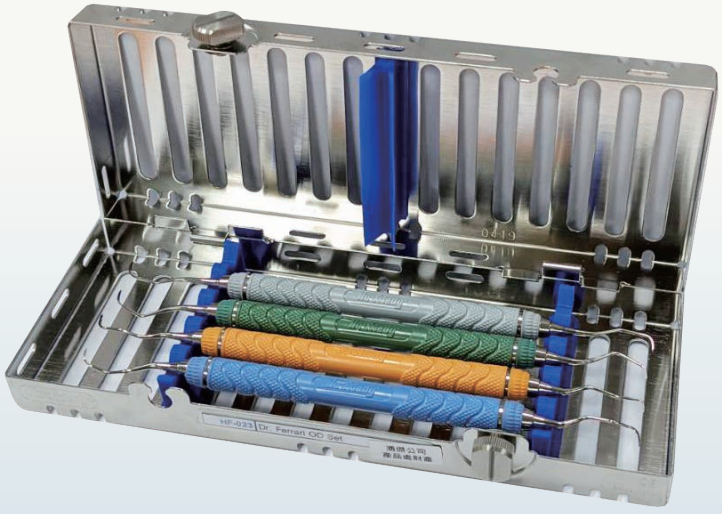
ALLEN END-CUTTING INTRASULCULAR

特價NT$1,610/支

EVEREDGE® 2.0 | BETTER THAN EVER

常用款

Gracey 1/2, 7/8, 11/12, 13/14



特價NT$7,070/組

(含4支器械+5支入器械盒一個)

- 內容物可任意更換EE2.0其他規格 (Sickle 或 Universal 皆可)
- 單支特價NT$1,155，四支NT$4,620
- 5入器械盒特價NT$2,450

· 衛部醫器輸壹字第016599、017988、020436號

牙周專科 鄭聖達醫師 推薦

PESIM16
Single-End
Instrument 3 mm

IMP6523S
Instrument Small

IMPSIM16
Instrument 3.5 mm

IMP6345-71
Instrument 3 mm

特價NT$2,100/支

套組特惠

整組推薦套組
特價NT$10,855/組
(含10支入器械盒)

IM510X

手術入門推薦套組

必備好幫手！

還在苦惱第一套手術器械該買什麼嗎？
我們為您挑選經典常賣單品，不用煩惱該挑選哪一隻！ 整包帶走就對了！！

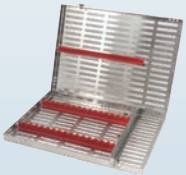
KGF86 Goldman Fox8
特價NT$2,170/支

PPBUSER6 Buser
特價NT$1,540/支

TPG1 Gerald (Straight Plain / 18cm)
特價NT$2,450/支

PPR36 Prichard
特價NT$1,820/支

KO1/26 Orban 1/2
特價NT$1,820/支



IM416X 16支入器械盒 (8色可選)
特價NT$4,060/個

套組特惠

整組手術入門推薦套組
特價NT$12,500/組
(含16支入器械盒)

另加購 Castroviejo 享65折
(款式任選)

· 衛部醫器輸壹字第016599、017988、020420、020321號

2021 Keynote Workshop

講師 —— 金牛頓工程師

技巧班 7/15 (四)

強化你的 Keynote 簡報力

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 —— 張慧男醫師

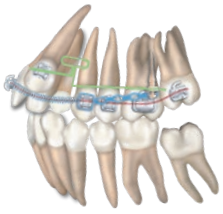
大師班 8/19 (四)

賈伯斯的簡報秘訣與設計要素

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且知識性豐富的專業演講。

- 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。



Newton's A
03-573-5676
info@newtonsa.com.tw
新竹市建中一路 25 號 2 樓

iNewton

BDE Now available on Google Play!

Beethoven Dental Encyclopedia

Free download now and get complete access of JDO

INSTALL

iOS / Android

All new design

-Add search by category, more friendly UI

Auto-resumed

-Automatically resume play from last view

My favorite

-Tab and add favorite videos, support background download

Direct registration

-Register directly and access instantly

Ortho Learning

Damon Master

OBS (TAD)

Finishing

E-Lecture

Implant Forum

Implant Forum

E-Clinic

E-Ortho

E-Pedo

E-Implant

Assistant

1. Now Beethoven video courses will only be available on Apple App Store or Google Play store.
2. A fee of NTD1000 or USD35 is required to upgrade to the iOS or Android version.
3. INewton retains all rights to interpret, amend or terminate this promotion program.

orthobonescrew.com
inewton.dental@gmail.com
+886-3-537-5676

2019 CDABO Case Report of the Year Award

Severe Unilateral Scissors-Bite with a Constricted Mandibular Arch: Bite Turbos and Extra-Alveolar Bone Screws in the Infra-Zygomatic Crests and Mandibular Buccal Shelf

Abstract

A 33-year-old woman had a chief complaint of difficulty chewing, caused by a constricted mandibular arch and a unilateral full buccal crossbite (scissors-bite or Brodie bite). She requested minimally invasive treatment, but agreed to anchorage with extra-alveolar temporary anchorage devices as needed. Her facial form was convex with protrusive but competent lips. Skeletally, the maxilla was protrusive (SNA, 86°) with an ANB angle of 5°. Amounts of crowding were 5mm in the mandibular arch and 3mm in the maxillary arch. The mandibular midline was deviated to the left about 2mm, which was consistent with a medially and inferiorly displaced mandibular right condyle. Ectopic eruption of the maxillary right permanent first molar to the buccal side of the mandibular first molar cusps resulted in a 2mm functional shift of the mandible to the left, which subsequently developed into a full buccal crossbite on the right side. Treatment was a conservative nonextraction approach with passive self-ligating brackets. Glass ionomer bite turbos were bonded on the occlusal surfaces of the maxillary left molars at 1 month into treatment. An extra-alveolar temporary anchorage device, a 2x12-mm OrthoBoneScrew® (iNewton, Inc., HsinChu City, Taiwan), was inserted in the right mandibular buccal shelf. Elastomeric chains, anchored by the OrthoBoneScrew, extended to lingual buttons bonded on the lingually inclined mandibular right molars. Cross elastics were added as secondary uprighting mechanics. The maxillary right bite turbos were reduced at 4 months and removed 1 month later. At 11 months, bite turbos were bonded on the lingual surfaces of the maxillary central incisors, and an OrthoBoneScrew was inserted in each infrazygomatic crest. The Class II relationship was resolved with bimaxillary retraction of the maxillary arch with infrazygomatic crest anchorage and inter-maxillary elastics. Interproximal reduction was performed to correct the black interdental spaces and the anterior flaring of the incisors. The scissors-bite and lingually inclined mandibular right posterior segment were sufficiently corrected after 3 months of treatment to establish adequate intermaxillary occlusion in the right posterior segments to intrude the maxillary right molars. The anterior bite turbos opened space for extrusion of the posterior teeth to level the mandibular arch, and the infrazygomatic crest bone screws anchored the retraction of the maxillary arch. In 27 months, this difficult malocclusion, with a Discrepancy Index score of 25, was treated to a Cast-Radiograph Evaluation score of 22 and a Pink and White esthetic score of 3. (Reprinted with permission from Am J Ortho Dentofacial Ortho 2018;154;554-69). (J Digital Orthod 2021;61:72-90)

Key words:

Scissors-bite, Brodie bite, buccal crossbite, lingually inclined lower molars, ectopic eruption, maxillary protrusion, lip protrusion, cross elastics, occlusal bite turbo, extra-alveolar anchorage, mandibular buccal shelf, mandibular rotation, infra-zygomatic crest, inter-proximal reduction, bone screws, TADs

Introduction

A buccal crossbite is a malocclusion when the palatal cusp of the maxillary tooth is buccal to the buccal cusp of the opposing mandibular dentition; a lingual crossbite is when the maxillary buccal cusp is lingual to the buccal cusp tip of the opposing mandibular tooth. Brodie[1] defined a malocclusion as a "*Brodie bite*" or "*Brodie syndrome*" when the mandibular jaw "*telescoped*" within the upper arch, i.e., the mandibular teeth

Angle Lee,
Editor, Journal of Digital Orthodontics (Left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

were completely contained within the upper arch. Sim[2] preferred the more generic term "*bilateral buccal crossbite,*" but van der Linden and Boersma[3] introduced the term "*scissors bite*" for the total "*endo-occlusion*" of the mandibular posterior teeth. Moyer[4] characterized a bilateral buccal crossbite as a skeletal disharmony between the mandible and maxilla. If the scissors-bite is bilateral, the mandible may be functionally retruded, and if it is unilateral, there is often a cant to the occlusal plane and a lateral deviation of the mandible.[4,5]

Fig. 1: Pretreatment facial and intraoral photographs

Diagnosis and Etiology

The patient's chief concern was the inability to chew on the right side. Her medical and dental histories were noncontributory. Facially, she had a convex profile with protrusive lips (*Fig. 1*), but her dental smile line was acceptable. The intraoral examination showered a scissors-bite on the right, a lingually inclined mandibular right posterior segment, Class I molar relationship on the left, an anterior deep overbite, canting of the occlusal plane down on the right, and mandibular anterior crowding (*Fig. 1*). The mandible deviated to the left on closure resulting in a dental midline shift 2mm to the left (*Fig. 2*). The dental casts showed that the maxillary right posterior teeth impinged on the mandibular gingiva, and there was no intercuspation of the right posterior segment (*Figs. 3 and 4*).

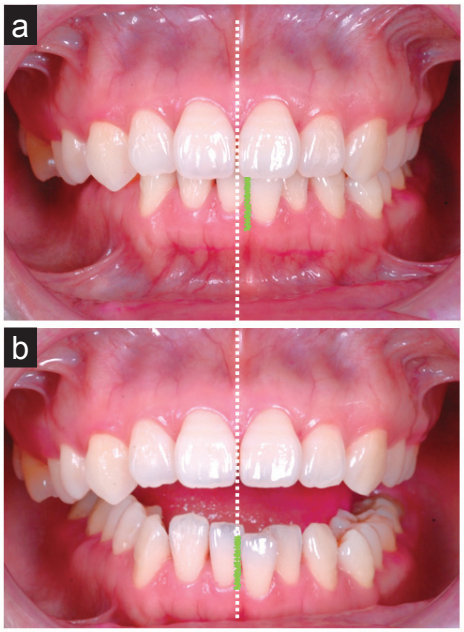


Fig. 2:
(a) Mandibular dental midline was deviated 2mm to the left when closed.
(b) The midline was coincident when the bite was opened.

The pretreatment cephalometric analysis showed a protrusive pattern of the maxilla, incisors, and lips (*Fig. 5; Table 1*). The panoramic radiograph showed extrusion of the mandibular right posterior segment (*Fig. 6*) consistent with the unilateral scissors-bite. The temporomandibular joint (*TMJ*) radiographs showed no significant difference in the morphology or kinematics (*movement*) of the right and left condyles

Fig. 3:
Dental casts showed the maxillary right premolars and molars impinging on the mandibular gingiva.

Fig. 4: Pretreatment dental models (casts)

Fig. 5: Pretreatment lateral cephalometric radiograph

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	86°	85°	1°
SNB° (80°)	81°	81°	0°
ANB° (2°)	5°	4°	1°
SN-MP° (32°)	34°	35°	1°
FMA° (25°)	27°	28°	1°
DENTAL ANALYSIS			
U1 To NA mm (4mm)	4	0	4
U1 To SN° (104°)	104°	98°	6°
L1 To NB mm (4mm)	9	6	3
L1 To MP° (90°)	100°	90°	10°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	2	1	1
E-LINE LL (0mm)	3	1	2

Table 1: Cephalometric summary

in the open and rest (*closed*) positions (*Fig. 7*), but the right condylar head in the rest position was more posteriorly and inferiorly positioned, which was consistent with mandibular deviation on closing (*Fig. 2*). No temporomandibular disorder (*TMD*) signs or symptoms were reported or clinically evident.

Asymmetric malocclusions such as scissors-bite may be associated with TMD,[6] and the etiology of the buccal crossbite may be genetic, congenital or developmental.[7] There was no history or morphologic evidence of a skeletal or dental anomaly, so the most likely etiology was developmental: a buccal ectopic eruption

Fig. 6: Pretreatment panoramic radiograph

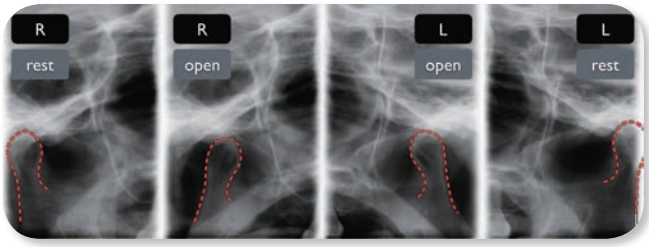


Fig. 7:
Pretreatment TMJ transcranial radiographs are shown of the right (R) and left (L) sides in the rest and open positions. The mandibular condyles are outlined in red. See texts for details.

of the maxillary right first molar at about age 6 years. This abnormal eruption pattern produces a functional shift of the mandible that results in the rest of the buccal segment erupting in buccal crossbite during the late transitional stage of dental development (*10-12 years*).[7] The American Board of Orthodontic (*ABO*) Discrepancy Index (*DI*) score for this malocclusion was 25 points, as shown in the supplementary worksheet 1.[8]

Treatment Objectives

(1) Correct the unilateral posterior scissors-bite.

(2) Upright the lingually inclined mandibular right buccal segment.

(3) Eliminate the occlusal cant due to the extruded maxillary right buccal segment.

(4) Achieve Class I canine and molar relationships.

(5) Correct the midline discrepancy.

(6) Produce ideal overbite and overjet relationships.

(7) Optimize the intermaxillary occlusion.

(8) Correct facial convexity and asymmetry.

Treatment Alternatives

Unilateral or bilateral scissors-bite of the entire buccal segment can be corrected with orthognathic surgery, biteplates or extensive use of interradicular (*I-R*) temporary anchorage devices (*TADs*) in both arches.[6,9-13] However, all of these approaches are complicated, because the asymmetric tooth movements necessary to finish the occlusion are challenging. No ideal dental alignments after treatment have been reported. A more conservative approach with the potential for a more ideal outcome was to reverse the etiology of scissors-bite by opening the vertical dimension of the occlusion (*VDO*) with glass ionomer bite turbos (*BTs*). With adequate occlusal clearance, the axial inclinations of the right buccal segments can be readily corrected with elastics anchored by a mandibular buccal shelf (*MBS*) bone screw (*miniscrew*) on the right side. Additional extra-alveolar (*E-A*) TADs in the infrazygomatic crest (*IZC*) are needed to correct the maxillary protrusion. Once normal bilateral occlusion is restored, optimal dental function facilitates the orthodontic finishing.

The patient was opposed to orthognathic surgery, extractions or compliance-dependent devices, but she still desired an ideal result. The conservative option with BTs and bone screws was her preference, and she was prepared for the occlusal inconvenience when the VDO was opened at the start of treatment. After an explanation of the anchorage requirements, she agreed to E-A TADs for mandibular right posterior alignment and retraction of the maxillary arch. To optimize dental esthetics, interproximal reduction was required to correct her black triangles.

Treatment Progress

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

torque brackets were bonded on all teeth in the maxillary arch. One month later, the mandibular arch was also bonded with standard torque brackets. The initial archwires were 0.014-in copper-nickel-titanium (*CuNiTi*). Two occlusal BTs were constructed with Fuji II type II glass ionomer cement (*GC America, Alsip IL*) on the maxillary left molars to increase the intermaxillary space to allow the collapsed mandibular right molars to upright with no resistance (*Fig. 8*). The mechanics to correct the scissors-bite were (*1*) an E-A MBS OrthoBoneScrew® (*OBS, 2x12-mm, iNewton, Inc., Hsinchu City, Taiwan*) inserted in the mandibular right buccal shelf,[14-17] with two power chains connected from the miniscrew to the two buttons on the lingual side of each mandibular right molar, and (*2*) two cross elastics (*Chipmunk, 1/8-in, 3.5-oz*) applied on the maxillary right and mandibular right molars. In the 4th month, the scissors-bite was corrected, so the thickness of the occlusal BTs was progressively reduced to begin establishing a normal bilateral posterior occlusion.

As the molars uprighted, the 6mm distance between the mandibular right miniscrew and the molar tube decreased to 0mm (*Fig. 9*). The MBS bone screw and occlusal BTs were removed in the 5th month of treatment. The maxillary archwire was changed to 0.014x0.025-in CuNiTi to resolve the remaining rotations, begin torque control, and continue the correction of arch symmetry. In the 6th month, the

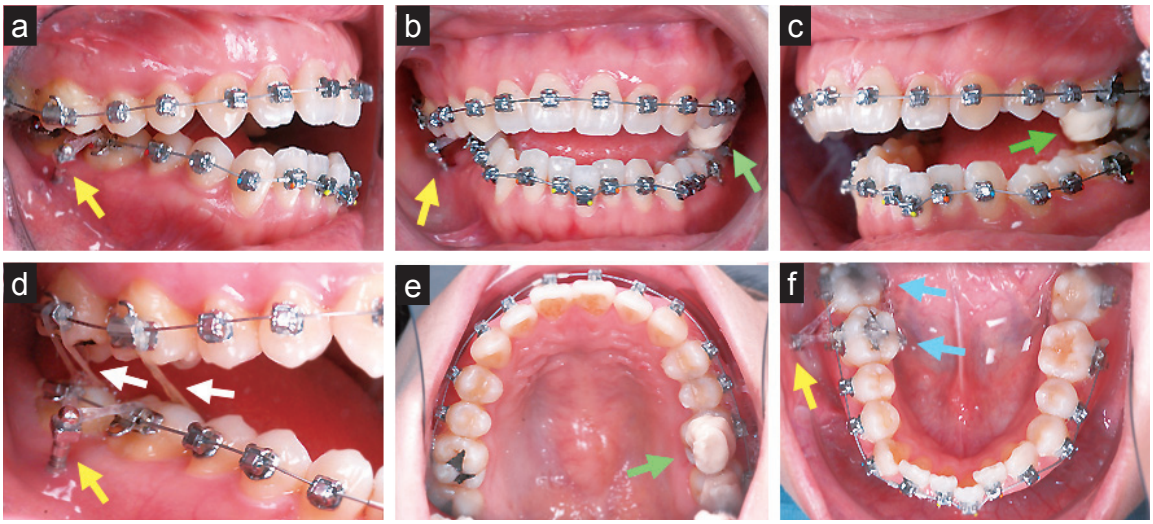


Fig. 8:

a. *In the 1st month of treatment, 0.014-in CuNiTi archwires were placed in both arches. Elastomeric chains from the lingual buttons on the mandibular right molars were activated with the MBS bone screw (yellow arrow).*

b. *BTs were added to the occlusal surfaces of the maxillary left molars (green arrow).*

c. *A buccal view shows that the bite is opened about 5mm (green arrow).*

d. *Cross elastics supplement the lateral force (white arrows) of the elastomeric chains that are attached to the MBS bone screw (yellow arrow).*

e. *An occlusal view shows the positions of the BTs (green arrow).*

f. *Buccal force (blue arrows) from the lingual buttons on the mandibular right molars is activated by attaching the elastomeric chains to the MBS bone screw (yellow arrow).*

Fig. 9:
The scissors-bite is documented at the start of treatment (0M). The elastomeric chains activated by the MBS bone screw are shown at one month into treatment (1M). The blue bar shows the distance from the bone screw to the first molar is about 7mm (middle right). At four months (4M), the molar have moved about 6mm to the buccal aspect and the distance from the molar to the bone screw is only about 1mm (lower right).

archwires were changed to 0.017x0.025-in titanium-molybdenum alloy (*TMA®*) in the maxillary arch and 0.014x0.025-in CuNiTi in the mandibular arch. A lingual crossbite tendency was noted for the left molars; thus, two buttons were bonded on the palatal surfaces of the maxillary left molars to anchor the cross elastics (*Chipmunk, 1/8-in, 3.5-oz*). In the 7th month, the maxillary archwire was changed to 0.016x0.025-in stainless-steel (*SS*), which was adjusted to deliver progressive lingual root torque on the right premolar and molar segments to improve the overjet and intermaxillary alignment. The SS archwire was also constricted to develop a more symmetric arch form. A 0.017x0.025-in TMA archwire was placed in the mandibular arch. In the 9th month, the archwire was changed to 0.019x0.025-in SS in the maxillary arch to finalize torque control, with 0.016x0.025-in SS in the mandibular arch to establish symmetry.

In the 10th month, an openbite was noted in the left posterior segment as the bilateral posterior occlusion was established. As the lateral open bite closed, a deeper anterior overbite occurred that subsequently required BTs on the maxillary central incisors. In retrospect, it would have been wiser to further intrude the molars on the right side to close the lateral open bite on the left side. This approach would have decreased or prevented the tendency for clockwise rotation of the mandible.

As the occlusion settled after crossbite correction, the intermaxillary relationship was Class II. In the 11th month, posterior bone screws were inserted bilaterally into the maxillary extra-alveolar IZCs. Power chains were applied from the canines to

Fig. 10:
The IPR procedure is shown before and after the incisors were reshaped to eliminate black interdental spaces, increase the contact area, and provide space for retraction of the anterior segment. Note that BTs were necessary on the palatal surfaces of the central incisors to control the overbite as the incisors were retracted to reduce lip protrusion.

the extra-alveolar IZC bone screws to improve the protrusive profile by retracting the entire maxillary dentition. Class II elastics (*Fox, 1/4-in, 3.5-oz*) and the BTs bonded on the palatal surface of the maxillary central incisors simultaneously corrected the deep overbite, anterior overjet, and Class II molar relationships.

During the detailing phase, the brackets were repositioned to correct marginal ridge discrepancies. Interproximal reduction (*IPR*) reshaped the maxillary and mandibular incisors to eliminate the black interdental spaces and increase the interproximal space between the incisors to resolve anterior flaring (*Fig. 10*). Two weeks before the completion of active treatment, the maxillary archwire was sectioned distally to the canines, and continuous intermaxillary elastics (*Ostrich, 3/4-in, 2-oz*) were used to settle the posterior occlusion.[18] After 27 months

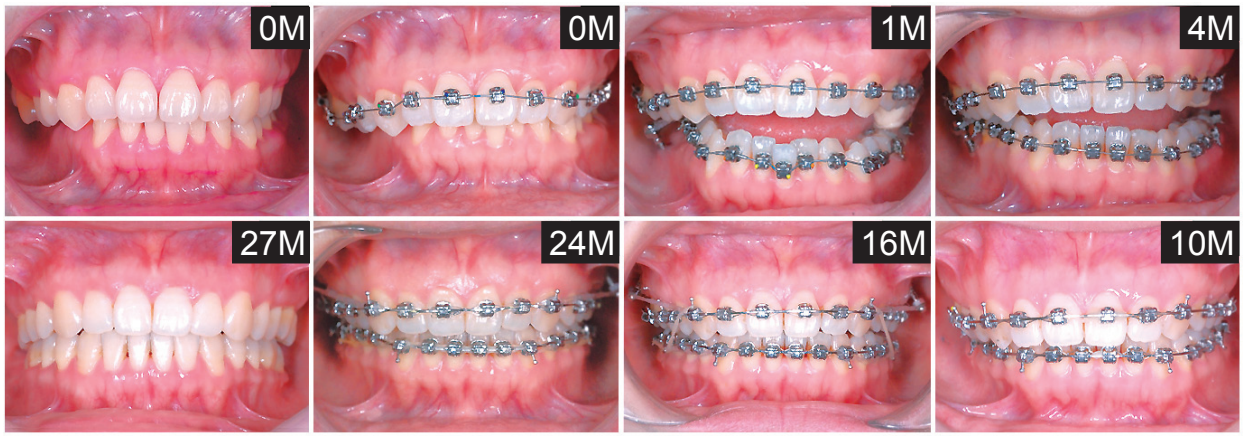


Fig. 11a:
Frontal views of the treatment sequence before treatment and after brackets were bonded on the maxillary arch (0M). Progress is shown at treatment times in months: 1M, 4M, 10M, 16M, 24M, and 27M.

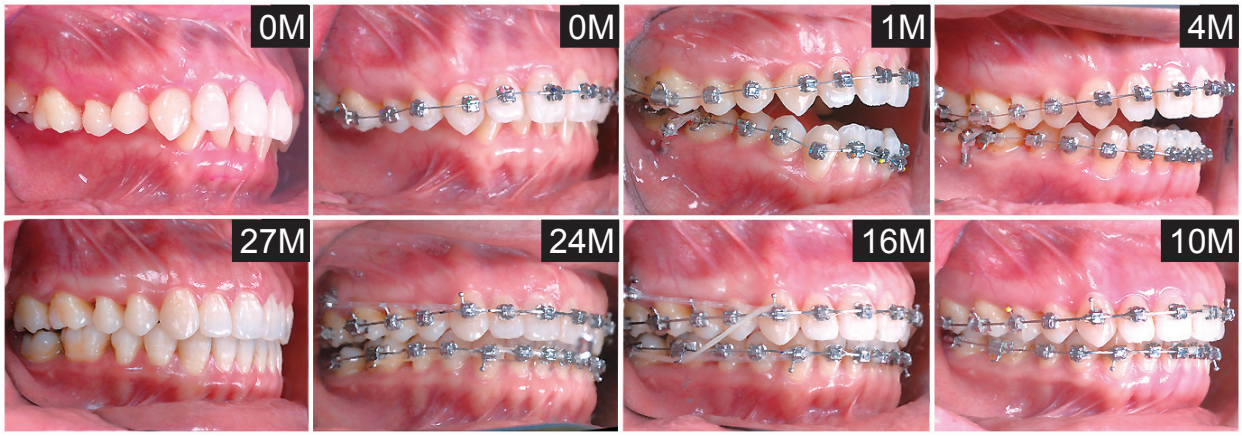


Fig. 11b:
Right lateral views of the treatment sequence before treatment and after brackets were bonded on the maxillary arch (0M). Progress is shown at treatment times in months: 1M, 4M, 10M, 16M, 24M, and 27M.

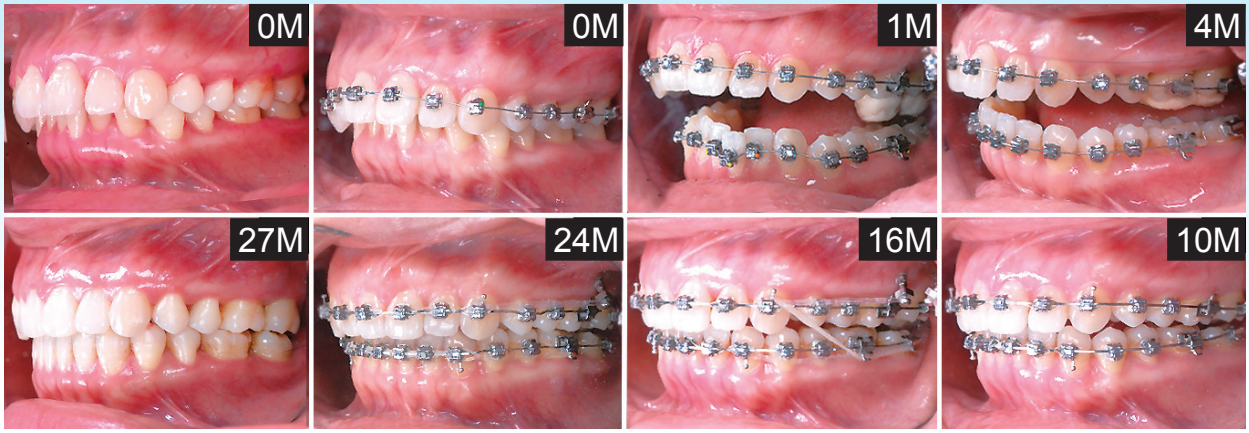


Fig. 11c:
Left lateral views of the treatment sequence before treatment and after brackets were bonded on the maxillary arch (0M). Progress is shown at treatment times in months: 1M, 4M, 10M, 16M, 24M, and 27M.

Fig. 11d:
Maxillary occlusal views of the treatment sequence before treatment and after brackets were bonded on the maxillary arch (0M). Progress is shown at treatment times in months: 1M, 4M, 10M, 16M, 24M, and 27M.

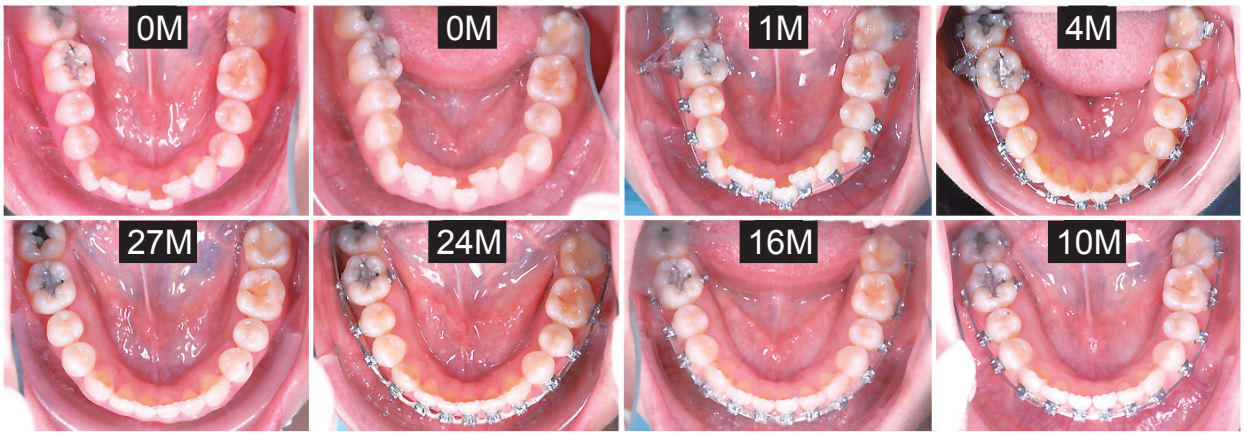


Fig. 11e:
Mandibular occlusal views of the treatment sequence before treatment and after brackets were bonded on the maxillary arch (0M). Progress is shown at treatment times in months: 1M, 4M, 10M, 16M, 24M, and 27M.

of active treatment, all appliances were removed, and retention was accomplished with maxillary and mandibular clear overlay retainers. The entire treatment sequence is documented in Figs. 11a-d.

Treatment Results

The patient's convex profile was improved by retraction of the maxillary arch and protrusive lips (*Fig. 12*). The scissors-bite was successfully resolved by opening the bite, uprighting the lingually inclined buccal segment and intruding the maxillary right posterior dentition (*Fig. 13*). The subsequent anterior deep over-bite and mandibular dental midline deviation were also corrected (*Fig. 14*). Near ideal dental alignment was achieved as evidenced by the ABO Cast-Radiograph Evaluation (*CRE*) score of 22 points, as shown in the supplementary worksheet 2.[19] The major residual problems were the marginal ridges discrepancies and inadequate occlusal contacts.

The posttreatment panoramic film (*Fig. 15*) showed good axial inclinations of all teeth except the mandibular molars, which had a root-mesial axial inclination that resulted in marginal ridge discrepancies (*Worksheet 2*). The cephalometric film (*Fig. 16*) and superimposed tracings (*Fig. 17*) showed that the lip protrusion was corrected. The SNA was decreased from 86° to 85° due to bone modeling

Fig. 12: Posttreatment facial and intraoral photographs

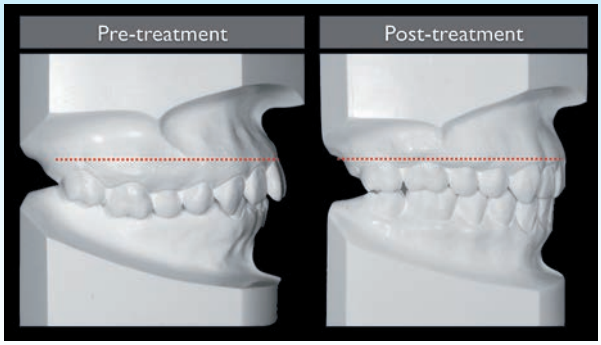


Fig. 13:
Right lateral views of the pretreatment and posttreatment dental casts show the intrusion of the maxillary right posterior teeth, relative to a dotted red line marking the plane of the desired gingival margins. Note that the mandibular right posterior teeth are not visible on the pretreatment cast.

Fig. 14: Posttreatment dental models (casts)

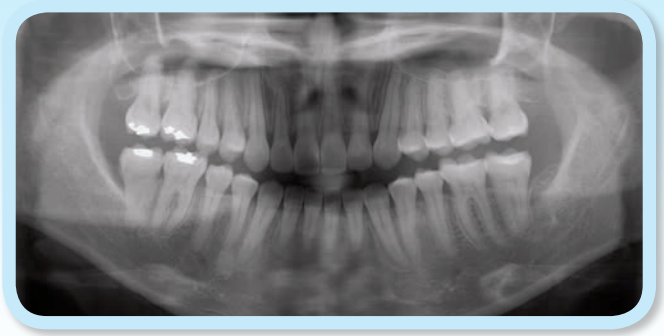


Fig. 15: Posttreatment panoramic radiograph

Fig. 16: Posttreatment lateral cephalometric radiograph

during retraction of the maxillary incisors. Both SN-MP and FMA increased by 1° due to the clockwise mandibular rotation (*Table 1; Fig. 17*), which appears to reflect inadequate intrusion of the mandibular right first molar (*Fig. 15*). The maxillary incisors were retracted and extruded, and the mandibular incisors were retracted and intruded. The maxillary molars were retracted and intruded, but the mandibular molars were retracted and extruded. The posttreatment TMJ transcranial radiographs (*Fig. 18*) showed that the condylar heads returned to symmetric morphology and kinematics. The patient reported no TMD signs or symptoms before, during, or after treatment.

The Pink and White dental esthetic score[20] was 3 points, as shown in the supplementary worksheet 3. The patient was well satisfied with her esthetics and functional occlusion.

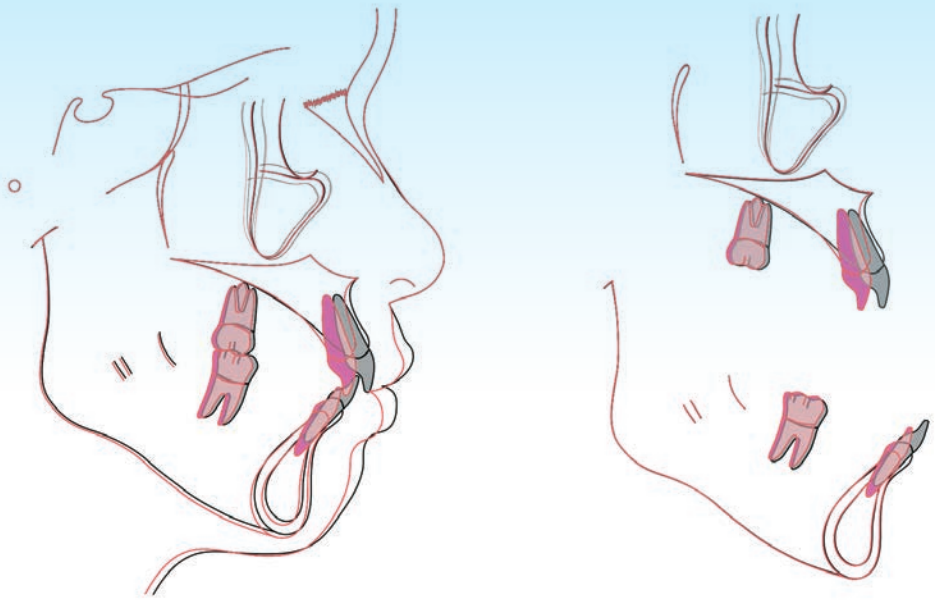


Fig. 17:
Pretreatment (black) and posttreatment (red) cephalometric tracings are superimposed on the anterior cranial base (left), the maxilla (upper right), and the mandible (lower right). The incisors were retracted and lip protrusion was reduced. Because of the poor alignment on the right side, the molars in the tracings are from the left side. Intrusion of the maxillary right buccal segment is shown in Fig. 13. See text for details.

Discussion

The first consideration for scissor-bite correction is to determine whether orthognathic surgery is necessary.[13] A wide variety of orthodontic mechanics have been proposed: intermaxillary cross elastics,[6] TAD anchorage,[9,10,12,13] removable plate with a Ti-Ni wire,[11] transpalatal arch (*TPA*) with intramaxillary elastics,[21,22] quad-helix,[23] and lingual arch appliances with intramaxillary elastics.[24] The vertical overlap of a buccal crossbite requires dental intrusion or opening of the bite to correct the cusp in a fossa discrepancy. For instance, unilateral cross elastics produce an extrusive force that may result in clockwise rotation of the mandible, cant of the occlusal plane, occlusal prematurities, or an anterior open bite. In addition, cooperation is a critical factor with a removable plate[11] or cross elastics.[25]

I-R miniscrews are commonly used as skeletal anchorage because they are relatively easy to place, provide direct anchorage to intrude teeth, and do not require compliance.[10,12,25,26] However, a scissor-bite of multiple teeth with a large vertical overlap is difficult to correct with routine orthodontic mechanics, even with bone screw anchorage, especially in an adult. Therefore, most severe scissors-bite problems have been corrected with surgical orthodontics.[6,27,28]

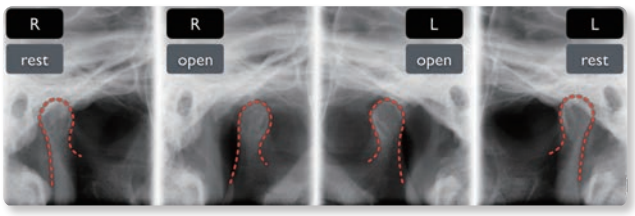


Fig. 18:
The posttreatment transcranial radiographs of both TMJs show that the patient's condylar heads (outlined in red) are symmetric in length and shape. Morphology and kinematics are similar for both sides in the rest and open positions.

Our patient had a scissors-bite of the maxillary right buccal segment that articulated with a lingually tipped mandibular right buccal segment. The

extruded maxillary right molars and premolars impinged on the mandibular gingiva (*Fig. 3*). Orthognathic surgery is usually indicated for such a severe malocclusion. However, E-A TADs with contralateral bite turbos allowed reverse of the etiology of the malocclusion by intruding the maxillary right buccal segment and uprighting the mandibular right buccal segment. There were three steps in the correction process:

1. **Adequate Bite Opening**: A 5mm posterior open-bite was created with BTs to allow the buccal cusps of the mandibular right molar and premolars to pass the lingual cusps of the opposing maxillary buccal segment (*Fig. 8*). The BTs were reduced and eventually removed when the posterior overjet was corrected.

2. **Simultaneous Intrusion and Buccal Tipping**: Elastic chains attached to the lingual buttons on the mandibular right molars pass over the occlusal surfaces and connect to the MBS bone screw. Because of the archwire connecting the teeth, these mechanics intruded and uprighted the entire buccal segment (*Figs. 8 and 9*). Supplemental cross elastics provided the additional lateral force for the crossbite correction. The extrusive force on the mandibular segment because of the cross elastics was offset by the intrusive force delivered by the elastomeric chains connected to the MBS bone screw. There are three benefits favoring a MBS bone screw compared with I-R bone screw:

   a. **Prominent Head**: The OBS has a large head with deep undercuts to readily retain elastomeric chains, which produce efficient uprighting of the mandibular right segment (*Fig. 19*).

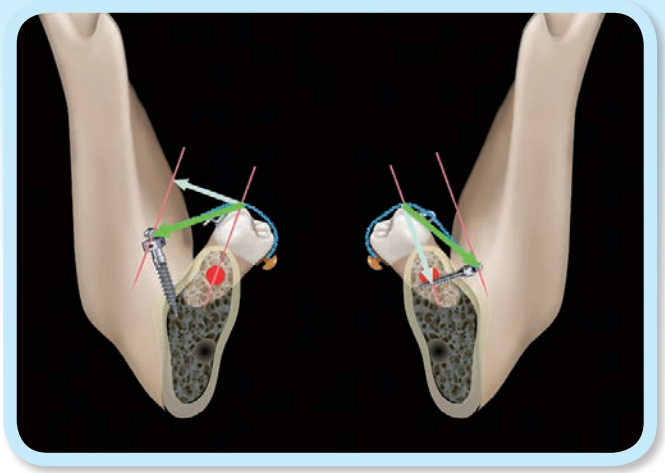


Fig. 19:
Comparing the I-R bone screw (right) with the contralateral E-A bone screw (left), it is evident that the elevated head position and more buccal position of the E-A TAD, relative to the center of rotation of the molar root (pink lines), provides a mechanical advantage for uprighting the molar (left).

   b. **More Buccal Position**: The E-A TAD can be positioned up to 10mm to the buccal aspect of the lingually tipped molars (*Fig. 19*). This is adequate space to upright the entire buccal segment with one bone screw. Elastic chains can be connected to both molars (*Fig. 20*) because they are connected with a archwire on the buccal surface. I-R TADs interfere with movement of the teeth, and frequent replacement would be necessary (*Fig. 19*).

   c. **Variable Head Position**: The OBS head can be positioned as close to the soft tissue as needed. The clinician can screw it in deeper if a more intrusive force component is needed (*Fig. 21*).

3. **Compatible with Cross Elastics**: An elastomeric chain anchored by an MBS bone screw provides effective intrusion of the mandibular right molars and is compatible with the simultaneous use of cross elastics. These combined mechanics uprighted the mandibular right molars 6mm in three months (*Figs. 8 and 9*).

A severe Class II unilateral scissors-bite was corrected with a minimally invasive approach that reversed the etiology of the malocclusion. This conservative treatment avoided extractions and orthognathic surgery. Once the transverse discrepancy was corrected, extra-alveolar IZC bone screws were used as E-A posterior maxillary anchorage to retract the entire maxillary arch. After 16 months of retraction, the patient's profile was corrected (*Fig. 22*). Her occlusion and facial esthetics were stable at 38 months after treatment (*Fig. 23*), and the second-order alignment of the dentition has continued to improve (*Fig. 24*).

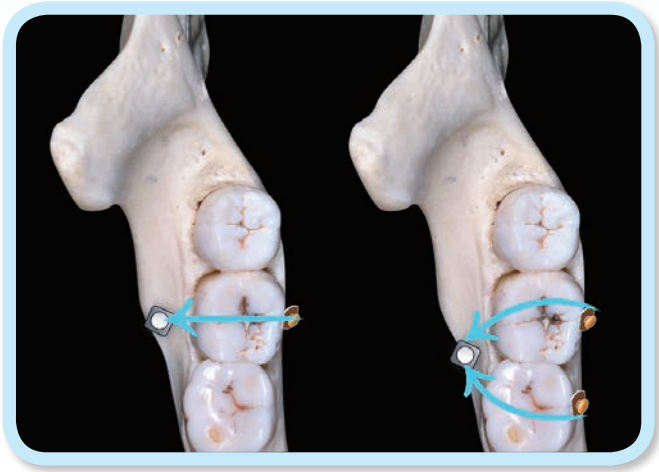


Fig. 20:
The E-A bone screw can be positioned buccal to the second molar or between the first and second molars. Either configuration is a viable alternative depending on the patient's anatomy because of the archwire, which transfers uprighting force to all teeth in the buccal segment.

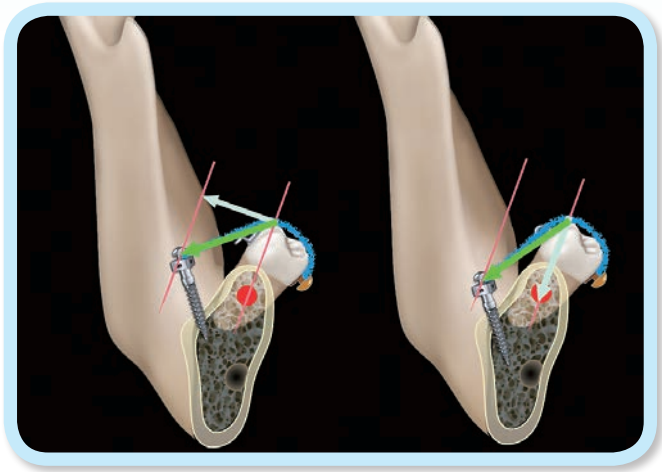


Fig. 21:
The head position height of the E-A bone screw can be controlled by the clinician. The force anchored by the higher (more superficial) bone screw head (left) delivers more buccal and less intrusive force compared with a screw head positioned more closely to the soft tissue (right).

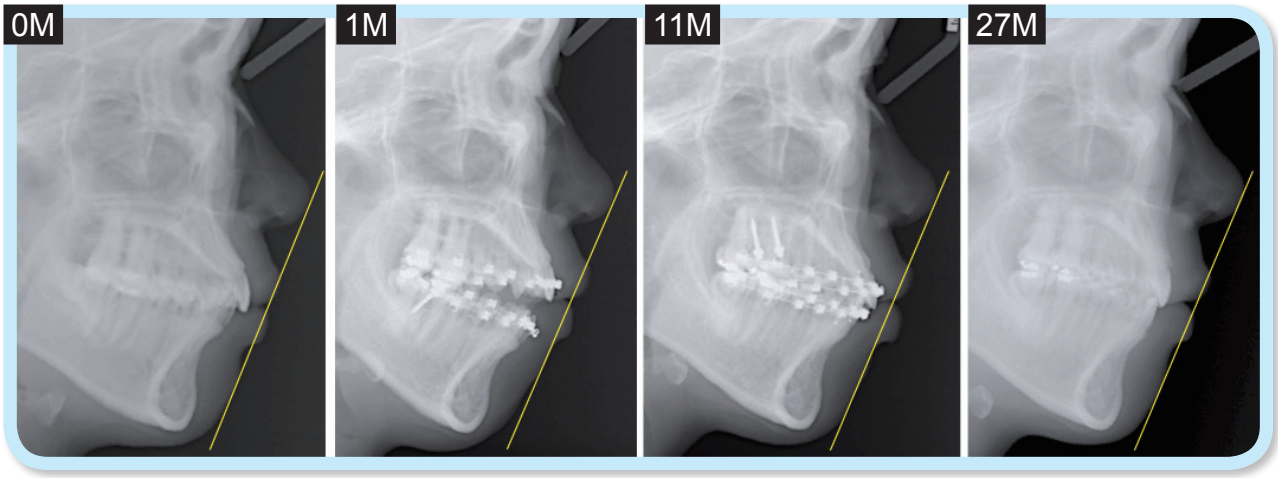


Fig. 22:
Lateral cephalometric radiographs compare lip protrusion before, during, and after treatment with the esthetic plane, a yellow line connecting the tip of the nose with the most anterior contour of the chin (Pg'). Before treatment (0M), the patient's lips were slightly protrusive. In the 1st month of treatment (1M), a 5mm open-bite was created by the occlusal BT on the upper left side. In the 1th month (11M), more pronounced maxillary and lip protrusion was noted. Bilateral extra-alveolar IZC bone screws were placed to retract the maxillary arch. In the 27th month of treatment (27M), lip protrusion was corrected to the Na-Pg' line (esthetic plane).

Fig. 23: Facial and intraoral photographs at 38-month follow-up

Fig. 24: Panoramic radiograph at 38-month follow-up

Conclusions

1. E-A bone screws are a minimally invasive approach for resolving severe scissors-bite malocclusion complicated with maxillary protrusion.
2. Uprighting the mandibular right buccal segment with a MBS bone screw provided a normal occlusion to intrude the extruded maxillary molars. However, it is important to ensure that there is adequate intrusion of the maxillary and mandibular molars on the affected side to prevent opening the VDO (*clockwise rotation of the mandible*).
3. Bilateral extra-alveolar IZC bone screws were effective for reducing maxillary protrusion by retracting the entire maxillary arch.
4. Correcting axial inclinations in the buccal segments is important for preventing marginal ridge discrepancies.

Acknowledgments

Thanks to Mr. Paul Head for proofreading this article and to Dr. Rungsi Thavarungkul for the beautiful illustrations.

References

1. Brodie AG. Bureau of public relations. Orthodontics. J Am Dent Assoc 1943;30(5):433-8.
2. Sim JM. Minor tooth movement in children. 2nd ed. St Louis: Mosby; 1977. p. 278-300.
3. Van der Linden FPGM, Boersma H. Diagnosis and treatment planning in dentofacial orthopedics. Chicago: Quintessence; 1987. p. 65, 266.
4. Moyers RE. Handbook of Orthodontics. 4th ed. Chicago: Year Book Medical; 1988. p. 392-6.
5. Proffit WR, Fields HW, Sarver DM. Special considerations in treatment for adults. Contemporary orthodontics. 4th ed. St Louis: Mosby 2007. p. 639-44.

6. Suda N, Tominaga N, Niinaka Y, Amagasa T, Moriyama K. Orthognathic treatment for a patient with facial asymmetry associated with unilateral scissors-bite and a collapsed mandibular arch. Am J Orthod Dentofacial Orthop 2012;141:94-104.
7. Kutin G, Hawes RR. Posterior cross-bites in the deciduous and mixed dentitions. Am J Orthod 1969;56:491-504.
8. Cangialosi TJ, Riolo ML, Owens SE, Jr., Dykhouse VJ, Moffitt AH, Grubb JE, Greco PM, English JD, James RD. The ABO discrepancy index: a measure of case complexity. Am J Orthod Dentofacial Orthop 2004;125:270-8.
9. Chugh VK, Sharma VP, Tandon P, Singh GP. Brodie bite with an extracted mandibular first molar in a young adult: a case report. Am J Orthod Dentofacial Orthop 2009;137:694-700.
10. Jung MH. Treatment of severe scissor bite in a middle-aged adult with orthodontic mini-implants. Am J Orthod Dentofacial Orthop 2011;139(Suppl):S154-65.
11. Ohmori H, Ono T. Unilateral scissors bite treated with a removable plate that incorporates a Ti-Ni wire. Orthodontics (Chic.) 2013;14:e222-6.
12. Ishihara Y, Kuroda S, Sugawara Y, Kurosaka H, Takano-Yamamoto T, Yamashiro T. Long-term stability of implant-anchored orthodontics in an adult patient with a Class II division 2 malocclusion and a unilateral scissors-bite. Am J Orthod Dentofacial Orthop 2014;145(Suppl):S100-13.
13. Kim KA, Yu JJ, Chen Y, Kim SJ, Kim SH, Nelson G. Surgery versus nonsurgery option for scissors bite treatment. J Craniofac Surg 2015;26:e726-9.
14. Chang CH, Huang C, Roberts WE. 3D cortical bone anatomy of the mandibular buccal shelf: a CBCT study to define sites for extra-alveolar bone screws to treat Class III malocclusion. Int J Orthod Implantol 2016;41:74-82.
15. Chang CH, Liu SS, Roberts WE. Primary failure rate for 1680 extra-alveolar mandibular buccal shelf mini-screws placed in movable mucous or attached gingiva. Angle Orthod 2015;85:905-10.
16. Chang CH, Roberts WE. Stability of mini-screws on buccal shelves: a retrospective study of 1680 mini-screw insertions by the same orthodontists. Int J Orthod Implantol 2013;30:76-8.
17. Chang CH, Roberts WE. A Retrospective Study of the Extra-alveolar Screw Placement on Buccal Shelves. Int J Orthod Implantol 2013;32:80-9.
18. Steffen JM, Haltom FT. The five-cent tooth positioner. J Clin Orthod 1987;21:528-9.
19. Casko JS, Vaden JL, Kokich VG, Damone J, James RD, Cangialosi TJ, Riolo ML, Owens SE, Jr., Bills ED. Objective grading system for dental casts and panoramic radiographs. American Board of Orthodontics. Am J Orthod Dentofacial Orthop 1998;114:589-99.
20. Su B. IBOI Pink and White esthetic score. Int J Orthod Implantol 2012;28:80-5.
21. Kucher G, Weiland FJ. Goal-oriented positioning of upper second molars using the palatal intrusion technique. Am J Orthod Dentofacial Orthop 1996;110:466-8.
22. Nakamura S, Miyajima K, Nagahara K, Yokoi Y. Correction of single-tooth crossbite. J Clin Orthod 1995;29:257-62.
23. Nojima K, Takaku S, Murase C, Nishii Y, Sueishi K. A case report of bilateral Brodie bite in early mixed dentition using bonded constriction quad-helix appliance. Bull Tokyo Dent Coll 2011;52:39-46.
24. Lim KF. Correction of posterior single-tooth crossbite. J Clin Orthod 1996;30:276.
25. Tamamura N, Kuroda S, Sugawara Y, Takano-Yamamoto T, Yamashiro T. Use of palatal miniscrew anchorage and lingual multi-bracket appliances to enhance efficiency of molar scissors-bite correction. Angle Orthod 2009;79:577-84.
26. Park HS, Kwon OW, Sung JH. Uprighting second molars with micro-implant anchorage. J Clin Orthod 2004;38:100-3.
27. Ramsay DS, Wallen TR, Bloomquist DS. Case report MM. Surgical-orthodontic correction of bilateral buccal crossbite (Brodie syndrome). Angle Orthod 1990;60:305-11.
28. Shimazaki K, Otsubo K, Yonemitsu I, Kimizuka S, Omura S, Ono T. Severe unilateral scissor bite and bimaxillary protrusion treated by horseshoe Le Fort I osteotomy combined with mid-alveolar osteotomy. Angle Orthod 2014;84:374-9.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 25

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 = 2

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 = 2

OCCLUSION

Class I to end on	=	0 pts.	
End on Class II or III	=	2 pts. per side	_____pts.
Full Class II or III	=	4 pts. per side	_____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 = 8

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° 1 x 1 pt. = 1

Total = 2

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	3	x 2 pts. =	6

Identify: over-erupted right premolars and molars

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) =_

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 =

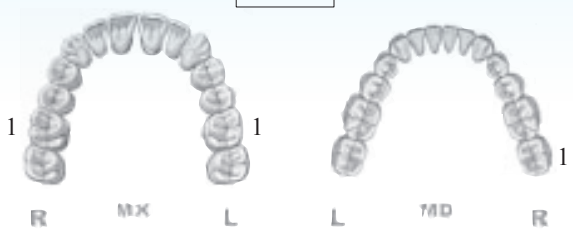
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 22

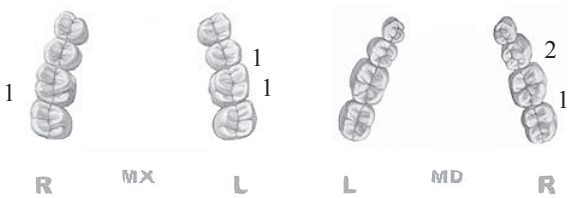
Alignment/Rotations

3



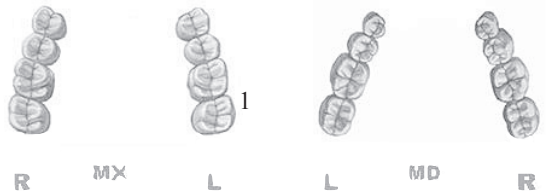
Marginal Ridges

6



Buccolingual Inclination

1

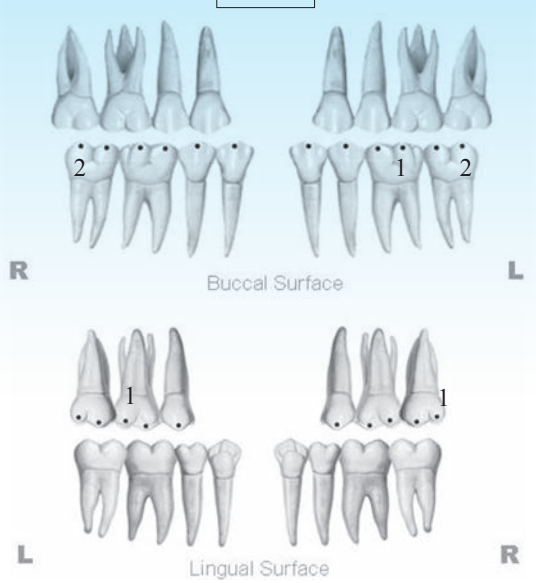


Overjet

1

Occlusal Contacts

7

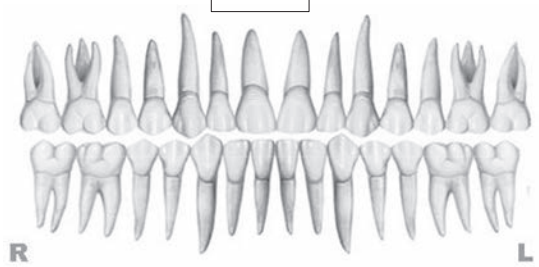


Occlusal Relationships

2

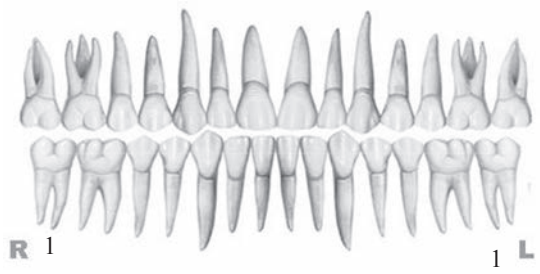
Interproximal Contacts

0



Root Angulation

2



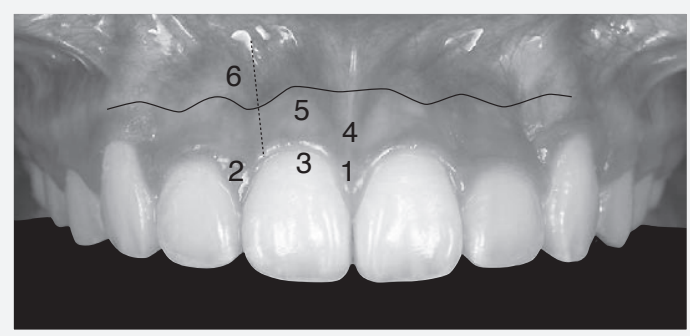
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

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

Total Score: = 3

1. Pink Esthetic Score

Total = 0

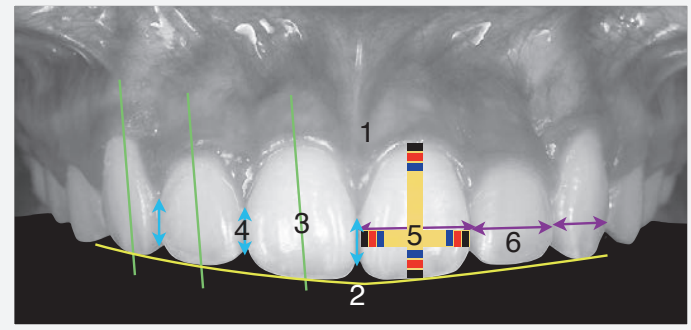


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 3



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

OBS Super Set

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

Smooth Mushroom Head

For comfort & retention of elastic chain

4-way Rectangular Holes

For lever arm to solve impacted tooth

Double Neck Design

Easy hygiene control & extra attachment

Made in Taiwan

New

Titanium Higher biocompatibility*

1.5 | 1.5X8mm

Stainless Steel**

2.0 | 2.0x12mm

2.7 | 2.0x14mm (with holes)

Buy a Super Set, get ***OBS Clinical Guide*** **(ebook on iPad)** for free.

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

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

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

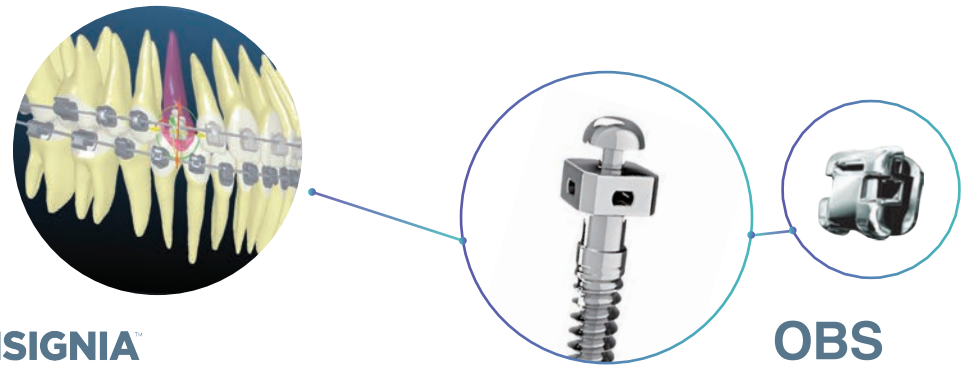
Dental Clinic Established 1996
Beethoven

International Workshop

Digital Orthodontics, OBS, VISTA

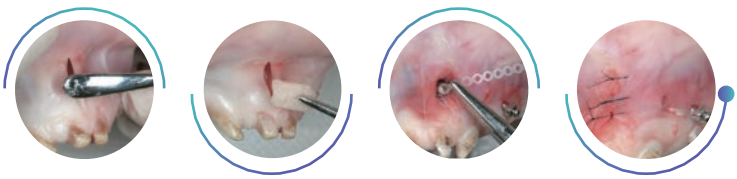
		Digital Orthodontics, OBS, VISTA	Keynote (optional)
2021	Session A	05/18–20	05/21
	Session B	12/07–09	12/10

@Taiwan



INSIGNIA™ OBS

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



VISTA Vertical Incision Subperiosteal Tunnel Access

Registration:

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

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

For more information and registration, visit

http://iworkshop.beethoven.tw

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

Course Schedule

Day 1 **Chair–side observation**

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

Chris' Lecture:
Digital Orthodontics with TAD

Day 3 **VISTA Lecture & workshop**

Chris' Lecture:
VISTA for Impacted Cuspids

* The topics for VISTA workshop:

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

Prof. Dr. Paulo Fernandes Retto, Portugal

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

Digital Orthodontics, OBS & VISTA

Day 4 **Keynote workshop** (Optional)

by Newton's A team

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

Dr. Rungsi Thavarungkul, Thailand

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

KEYNOTE

THE LECTURER

Dr. Chris Chang

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

Feedback from Damon Master Taiwan 2020

彭得晃 醫師
Damon Master 台灣班

從貝多芬出來的學員有很多已在外頭教學演講，特徵是他們的幻燈片，簡單的說在這裡除矯正之外也能同時學會最高水準的幻燈片製作和演講技巧。跟張醫師是大學同班同學，認識他整整40年，對他的個性與行事風格頗為了解，雖然外頭的矯正課程很多，我仍然毫不猶豫地選擇上他的課。張醫師凡事講求效率，需要不斷重複做的事他會將其公式化訂出 SOP，執行過程中不斷的修正簡化以求將來他再做的時候可以不用大腦，哈哈“不用大腦”，真的是這樣，也因為有標準的 SOP，他交代給其他駐院醫師處理的時候也不容易出錯。來上課的目的除了學會矯正，當然更要將他治療患者的 SOP 學起來。上課的教室牆上掛著一個座右銘—“好謀而成，不疾而速；化繁為簡，樂享正畸”，這即是本課程的風格。

蔡宜芮 醫師
Damon Master 台灣班

從大學時期開始，矯正就是一個玄學，即使教科書讀了再多次也沒有用，但張醫師把複雜的文字用清楚的動畫呈現，配合張醫師有趣的解說，把深硬難懂的矯正理論變成了淺顯易懂的語言。很多人在上了矯正課後卻沒有開始做矯正的勇氣，但張醫師的課程讓矯正變簡單了，非常推薦給想開始做矯正的新手們～

楊秉沅 醫師
Damon Master 台灣班

一年的上課時間，在還意猶未盡時就悄悄結束了。課程結束後，心中想要繼續跟著張醫師的腳步學習矯正知識與臨床經驗的動力不斷湧入。從東部來到西部上課，路途即便遙遠，但每次課程中的收穫與學習讓我已忘記舟車勞頓的辛苦。上課內容除了矯正學理，更用幽默風趣的互動讓氣氛更活潑生動，授課 slide 更是我目前看過最有美感跟清楚的教材。如果你想學的不只是矯正的技術跟知識，還能吸收到張醫師 35 年矯正執業的人生歷練及經營管理。這系列課程推薦你來參與！

林家如 醫師
Damon Master 台灣班

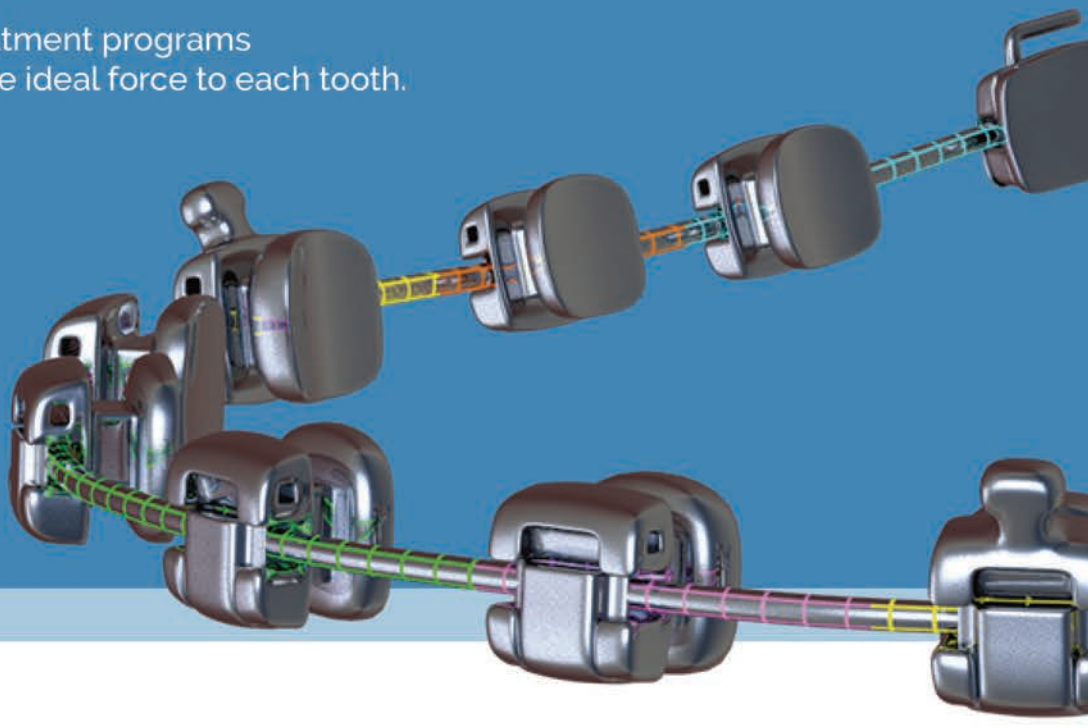
原本對於博大精深的矯正領域一直望之卻步，想跨出第一步卻又無從下手，直到聽了很多醫師推薦張醫師的矯正班，於是抱著期待的心情開始了這歷經十個月的課程。張醫師深入淺出的教學模式搭配上精彩的演說技巧，讓人覺得每次的課程都獲益良多！每分每秒都精彩！即便是舟車勞頓特地從台東到新竹聽課，都讓我覺得很值得！更重要的是，對於矯正新手的我來說，張醫師給了我很大的信心開始嘗試尋找自己的 first case，踏出第一步總是最困難的，但很感謝因為張醫師的課程，讓我有勇氣嘗試跨出矯正的第一步。

Ormco

TWO WIRES INSTEAD OF FOUR

Introducing SmartArch,™ designed to allow clinicians to move into a finishing wire after just two archwires.

The patented laser treatment programs SmartArch to deliver the ideal force to each tooth.



NEW

SMARTARCH™

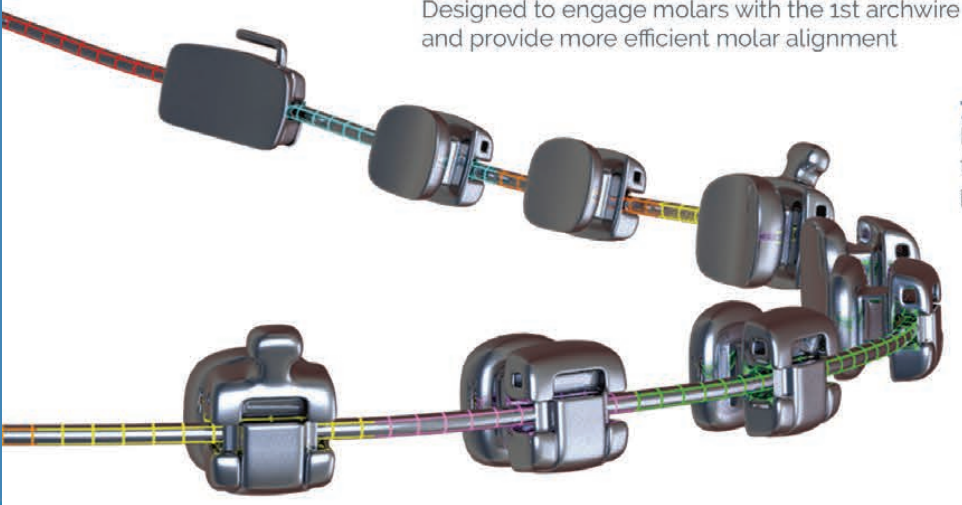
Laser Engineered CuNiTi

ormco.com

NEW SMARTARCH™

Laser Engineered CuNiTi

Fewer Wire Changes Ideal Force for Each Tooth



Efficient Molar Engagement

Designed to engage molars with the 1st archwire and provide more efficient molar alignment

7 Distinct Force Zones

Programed to deliver the ideal force to each individual tooth and equalize pressure along the PDL

Reduced Friction

Laser processing reduces friction between wire and bracket surfaces, promoting overall treatment efficiency

Computer Engineered

Engineered using finite-element-analysis, the SmartArch design accounts for variations in inter-bracket distance, root size, and the root-to-crown relationship

Less Wire Disengagement

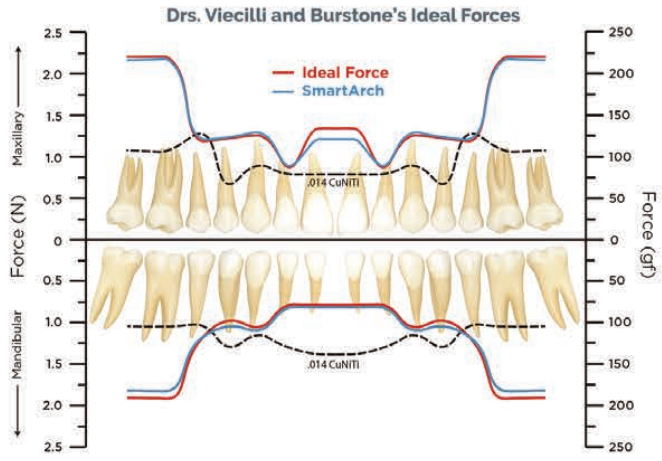
Increased posterior stiffness designed to reduce likelihood of disengagement from buccal tubes and may reduce associated emergency appointments

The Science Behind SmartArch

A patented, pulsating laser programs SmartArch to deliver forces closely matching Drs. Viecilli and Burstone's established ideals. By applying ideal forces SmartArch promotes efficient tooth movement and may reduce overall treatment time.

SmartArch CuNiTi
200x

Standard CuNiTi
200x



Drs. Viecilli and Burstone utilized finite-element-analysis (FEA) to establish the ideal force load for each individual tooth

To learn more, contact your Ormco representative at 800.854.1741

Ormco

Ormco Corporation
1332 South Lone Hill Avenue | Glendora, CA 91740
ormco.com | 800-854-1741

070-5008 Rev. A
2018-02-11

2021 Implant Forum

**“作為一個現在的牙醫師你不可能不學 Implant，
當你學了 Implant，會急速地擴大你牙科的操作範圍，
而植牙論壇就是最好的訓練。”**

-Dr. 張慧男-

**“歡迎大家和我們一起藉由每月一次的持續進修，
保持對臨床的熱情和敏感度；並期許能提供給病人
最佳的治療。”**

-Dr. 邱上珍-

“歡迎與我們一起精進學習，分享傳承彼此的經驗。”

-Dr. 蘇筌瑋-

**“數位科技的進步，讓牙科日新月異，適合已經有基礎的牙
醫師持續進修。”**

-Dr. 林森田-

2021 Implant Forum

地點：

新竹市建中一路25號2樓
（金牛頓藝術科技）

時間：

星期五上午 9:00-12:00
（每月一次）

報名專線：

03-5735676#203
clinton@newtonsa.com.tw
陳建名

	日期	專題演講 9:00 - 10:30	植牙案例報告 10:45 - 12:00（30 分鐘 / 人）	
1	3/19	**陳明時 醫師**（美國 Ohio State University 牙醫學院．碩士、美國德州 M.D. Anderson Cancer Hospital 專科醫師） **主題：** Part I：“Occlusal Scheme” ? “Organic Occlusion”! Part II：Comprehensive Treatment Plan Part III：Treatment Planning、Design、Option、Execution Part IV：Claspless RPD replacing Conventional Clasp RPD		
2	4/9	**黃裕新 醫師**（裕見美牙醫診所院長、台灣大學牙醫學系第一名畢業、美國賓州大學學術交流、美國南加大植牙美學專科訓練、美國華盛頓大學全口重建訓練、「裕見。新美學」瓷牙美學講師、2016 Dentsply 牙體復形競賽全球第三、2015 Dentsply 牙體復形競賽台灣冠軍、Nobel Biocare 產品發表會客座講師、台灣植體醫學會會員） **主題：前牙美學 軟組織的究極進化**		
3	5/28	**邱上珍 醫師**（美國明尼蘇達大學牙周病學碩士、美國牙周病學會院士） **題目：** Implants in Esthetic Zone	**蕭浩宜 醫師**（美國南加州大學植牙研究所進修、新綠牙醫診所院長）	**張慧男 醫師**（美國印第安那普渡大學齒顎矯正研究所博士）
4	6/18	**王巍穆 醫師**（基督教安息會台安醫院贋復牙科主任、台北醫學大學牙醫學院兼任講師暨牙科部主治醫師、佛教慈濟綜合醫院台北分院牙科部贋復科主治醫師、德國法蘭克福大學牙醫學院口腔植體學碩士、國立陽明大學口腔贋復碩士、台北榮民總醫院牙科部兼任主治醫師） **題目：**Prosthetic Driven Concept to Create Zero Bone Loss		
5	7/23	**蘇筌瑋 醫師**（高雄醫學大學牙周病學碩士、國際矯正植牙學會理事長） **主題：垂直前庭切線骨膜下隧道法**		
6	8/20	**林涵威 醫師**（台大醫學院臨床牙醫研究所碩士、台北醫學大學牙醫學士、衛福部定口腔顎面外科專科醫師、德國 Steigmann Institute 進階植牙訓練、第58屆日本口腔顎面外科大會傑出論文獎） **題目：**All-on-4 Basic Concept		
7	9/17	**陳健誌 醫師**（台北醫學大學牙醫學士、臺大牙醫專業學院臨床牙醫學研究所碩士暨博士、臺大牙醫專業學院牙醫學系兼任講師、台北醫學大學牙醫學院牙醫學系兼任助理教授） **題目：**The Modern Concept of Implant Location and Occlusion in Digital Dentistry	**林森田 醫師**（中山醫學大學學士、國際矯正植牙學會院士、美國南加州大學植牙研究所進修）	**翁蔚任 醫師**（中華民國植牙醫學會專科醫師、中華民國家庭牙醫學會專科醫師、高雄醫學大學牙醫學士）
8	10/22	**郭博仁 醫師**（臺灣牙周病醫學會專科醫師、中華審美牙醫學會專科醫師、中華植體美學醫學會專科醫師、日本審美牙科學會認定醫師、高雄醫學大學牙醫學士、國防醫學院牙科臨床研究所牙周病學碩士、國防醫學院醫學科學研究所博士、國防醫學院牙醫學系兼任助理教授、林錦榮齒列矯正中心牙周病醫師） **題目：**Another Tool in Your Toolbox: Alveolar Ridge Preservation （巧取補骨先機：齒槽嵴保存術）		
9	11/19	**李頌平 醫師**（台北醫學大學牙醫學系畢業、中華民國植體學會學員、台灣口腔矯正學會學員、中華民國口腔植體學會學員） **題目：**Daily Practice with Total Digital Dental Solution		
10	12/24	**蘇裕隆 醫師**（陽明大學牙醫學士、FB 前牙美學達人） **題目：前牙美學**	**黃育新 醫師**（國際矯正植牙學會院士、台北醫學大學牙醫學系、台灣植牙醫學會專科醫師）	**張慧男 醫師**（美國印第安那普渡大學齒顎矯正研究所博士）

本課表僅供參考，植牙論壇保留課程變動之權利

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

Dr. John JJ Lin, Taipei, Taiwan

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

Dr. Tom Pitts, Reno, Nevadav, USA

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

Dr. Javier Prieto, Segovia, Spain

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

Dr. Don Drake, South Dakota, USA

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

Dr. Ron Bellohusen, New York, USA

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

Dr. Mike Steffen, Oklahoma, USA

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

Dr. Doraida Abramowitz, Florida, USA

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

Dr. Robert S Chen, California, USA

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

Dr. John Freeman, California, USA

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

Dr. Keyes Townsend Jr, Colorado, USA

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

Dr. Jerry Watanabe, California, USA

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

Dr. Errol Yim, Hawaii, USA

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

Dr. James Morrish Jr, Florida, USA

New Release!

Dr. Chris Chang with the participants from Damon Master Taiwan, class of 2020, who finished their year-long program in the beginning of 2021.