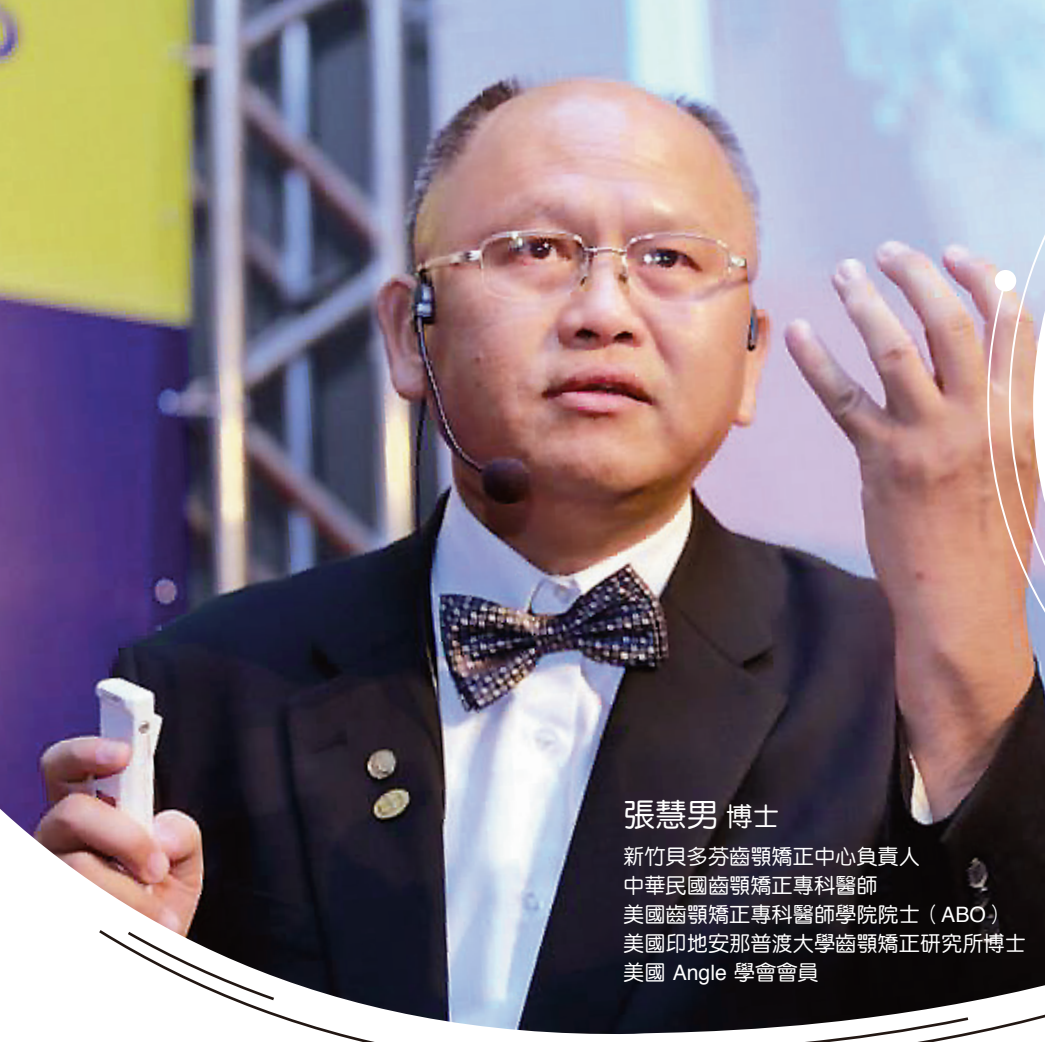
IJOI
International Journal of Orthodontics & Implantology
Vol. 45 Jan 1, 2017




Photo collage (from left, clockwise) of Dr. Birte Melsen giving a haircut for Charles Burstone; the Beethoven international workshop; Advanced Keynote workshop; Damon Bonding workshop. Participants take photos with Drs. John Lin, Chris Chang and Rungsi Thavarungkul at Newton's A, Hsinchu, Taiwan.

*International Journal of Orthodontics & Implantology* is an experience sharing magazine for worldwide orthodontists and Implantologists. Download it at *http://iaoi.pro.*

《僅供牙科專業人士參閱》



# 2016-17
# 熱愛學矯正

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

**張慧男 博士**

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

## Damon Master

(Thu) 9:00-5:00 中文授課

The new 2017 Beethoven Damon Master Program, created by Dr. Chris Chang, is a two-year clinical program. Its hands-on orientation features case study-based diagnosis, analysis, treatment planning and result evaluation. Combining in-class teaching assistants, after-class video review and chair-side observation, participants will learn to master the essential tips of the Damon System.

### Year 1 2017

Module 1 - **5/4**/17' Module 4 - **8/10**
Module 2 - **6/8** Module 5 - **9/28**
Module 3 - **7/6** Module 6 - **To be announced**

### Year 2 2017-18

Module 1 - **10/6** Module 4 - **1/4**/18'
Module 2 - **11/9** Module 5 - **2/1**
Module 3 - **12/21**

## Excellent Finishing

(Tue) 9:00-12:00 中文授課

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

### Finishing VIII

Module 1 - **8/9**/16' Module 6 - **2/14**/17'
Module 2 - **9/20** Module 7 - **3/14**
Module 3 - **10/18** Module 8 - **4/11**
Module 4 - **11/22** Module 9 - **5/9**
Module 5 - **12/13** Module 10 - **6/13**
Module 11 - **7/11**

## Damon, OBS & VISTA International Workshop

English Class

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

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

### 2016

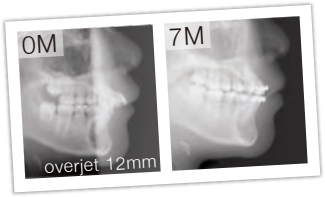
Class 1 - **4/26-29** Class 2 - **10/18-21**

### 2017

Class 1 - **5/16-19** Class 2 - **11/28-12/1**

Damon + .014 Cu NiTi

Damon Clear



Damon + Bite Turbo + Early Light Short Elastic

每次上課請依最新一期 IJOI 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)

## Right time, right place and the impact thereof.

Every time I return home from lecturing abroad, I feel extremely lucky to have been born and to practice professionally in Taiwan. Many of you might wonder, why? Are not other countries much better than Taiwan? There are definite pros and cons for all countries, but for me, Taiwan is the place to be.

I have reached this conclusion after being disappointed by some foreign colleagues. I have always assumed that Orthodontists in countries with such high technology and a great appreciation of art would have the initiative to find solutions to advanced cases, be on the cutting edge and up to date with the latest evolutions of our profession. There are some of them who are, however, several are bound by the social welfare systems, quotas and national health insurance systems, which together take away driving motivation to improve oneself professionally and therefore also effect the advancement of Orthodontics.

I can't imagine being in that position myself, as I have thrived on playing a role in the evolution and impact of the Taiwanese miniscrew invention, allowing Orthodontists to unravel the mysteries of previously unsolvable cases, especially tough impactions and Class III maloclussions.

Unfortunately, I have been saddened to see the effects of socialist ideologies on Orthodontics, but now maybe there is a president who can "*trump*" this (*please forgive the pun!!*) and we will hopefully be able to see his global "*impact*" to release Orthodontists from social welfare quotas and allow them to bloom to their fullest potential.

I have deduced that Orthodontics and a social system do not fit together and thus I feel I have been extremely lucky to have been in the right place at the right time to help further our beloved profession. I hope that many of you share the same feeling and will continue to march together on the path to glory.

*Chris Chang* DDS, PhD, Publisher of IJOI.
Correspondance address:
2F, 25, Jian Jhong First Road, Hsinchu, Taiwan 30070

# Probable Airway Etiology for a Severe Class III Openbite Malocclusion: Conservative Treatment with Extra-Alveolar Bone Screws and Intermaxillary Elastics


## Abstract

*A 20yr female presented with a severe Class III malocclusion, anterior openbite, posterior crossbite, facial asymmetry, and mandibular deviation to the left. Chief concerns were poor esthetics, and compromised occlusal function.*

***Diagnosis**: The bilateral full-cusp (8-9-mm) Class III malocclusion was complicated with maxillary retrusion (SNA 78°), prognathic mandible (ANB -2°), steep mandibular plane (FMA 39.5°), anterior crossbite/openbite, peg-sharped upper lateral incisors, ectopic eruption of the upper right (UR) canine, and a 3-mm lower left (LL) mandibular deviation. The Discrepancy Index (DI) was 62.*

***Etiology**: Dentofacial morphology was consistent with compensation for a childhood airway problem, resulting in posterior mandibular rotation, a long face, habitual low tongue position, and an interdental soft tissue posture (tongue and/or lower lip) between the anterior segments. Md deviation to the left in the absence of a history or evidence of an occlusal shift appears to be related to habitual sleep posture on the right side of the face. The peg lateral incisors, and ectopic eruption of the UR canine are genetic traits.*

***Treatment**: Most complex functional malocclusions are best managed with conservative (non-extraction and non-surgical) treatment that tends to reverse the etiology of the problem. A full-fixed passive self-ligating appliance with extra-alveolar (E-A) bone screw anchorage was indicated. Since the patient's lips were marginally competent, the preferred anchorage were three extra-alveolar (E-A) bone screws: right mandibular buccal shelf (MBS), and infrazygomatic crest (IZC), bilaterally. Differential Class III intermaxillary elastics were used to correct the Class III occlusal relationship and midline discrepancy.*

***Results**: Superimposition of cephalometric tracings documented retraction and rotation of the lower arch to correct the Class III discrepancy and the anterior openbite. The mandibular plane remained stable, and dentofacial esthetics were markedly improved, resulting in a Pink & White dental esthetics score of 2. The interdental soft tissue posture and anterior openbite resolved spontaneously as the dental alignment was corrected to an excellent cast-radiograph evaluation (CRE) of 17 points. (Int J Orthod Implantol 2017;45:4-20)*



***Key words:***
*Self-ligating appliance, IZC (infrazygomatic crest), buccal shelf, miniscrew, open bite, cross bite, midline off, chin deviated, peg laterals, Tomy's LH (Low Hysteresis) MEAW wire*


## History and Etiology

A 20-year-4-month-old female presented for orthodontic consultation with multiple concerns: compromised facial esthetics, inability to incise food, and poor masticatory function overall. A clinical exam revealed a Class III malocclusion with anterior openbite, crossbite, delayed exfoliation of the deciduous upper right canine (*URc**), ectopic eruption of the permanent upper right canine (*UR3**), bilateral peg upper lateral incisors,

* *International nomenclature is a modified Palmer notation relative to the midline for: 1. quadrants which are upper (U) and lower (L) on the right (R) and left (L) sides, 2. deciduous teeth are a-e, and 3. permanent teeth are 1-8.*

**Dr. Ming-Jen Chang,**
*Lecturer, Beethoven Orthodontic Course (Left)*

**Dr. John Jin-Jong Lin,**
*Examiner of IJOI, Director of Jing-Jong Lin Orthodontic Clinic (Center)*

**Dr. W. Eugene Roberts,**
*Editor-in-chief, International Journal of Orthodontics & Implantology (Right)*

*Fig. 1: Pre-treatment facial photographs*

*Fig. 4: Post-treatment facial photographs*

*Fig. 2: Pre-treatment intraoral photographs*

*Fig. 5: Post-treatment intraoral photographs*

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

*Fig. 6:*
*Post-treatment study models (casts) revealed modest expansion in both arches.*

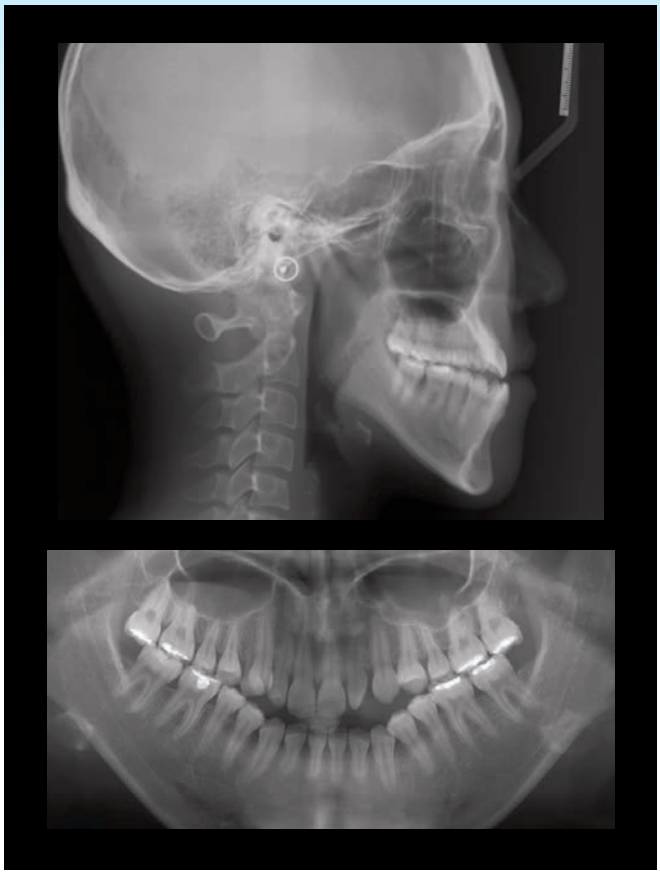


*Fig. 7:*
*Pre-treatment panoramic (upper) and cephalometric (lower) radiographs*

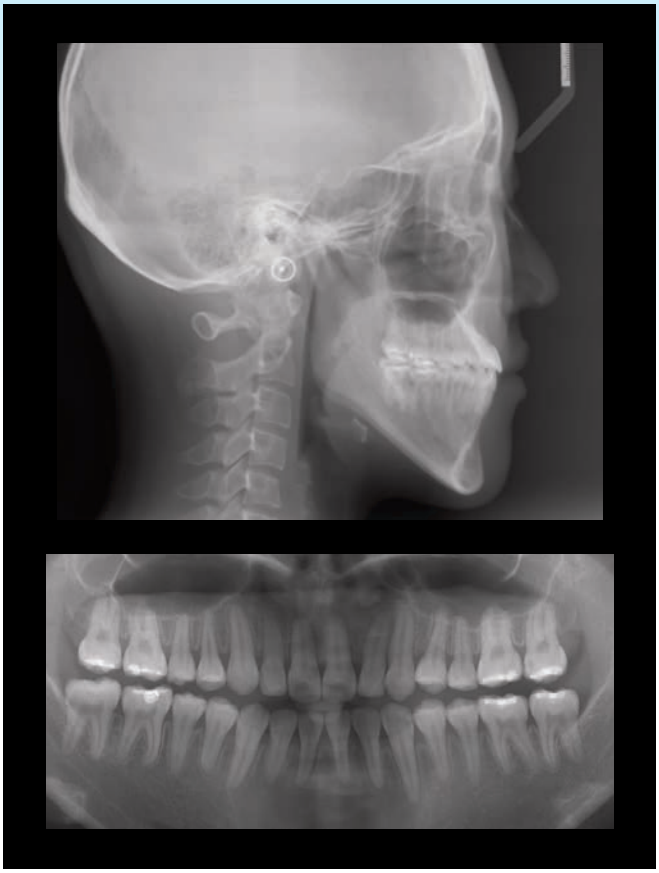


*Fig. 8:*
*Post-treatment panoramic (upper) and cephalometric (lower) radiographs*

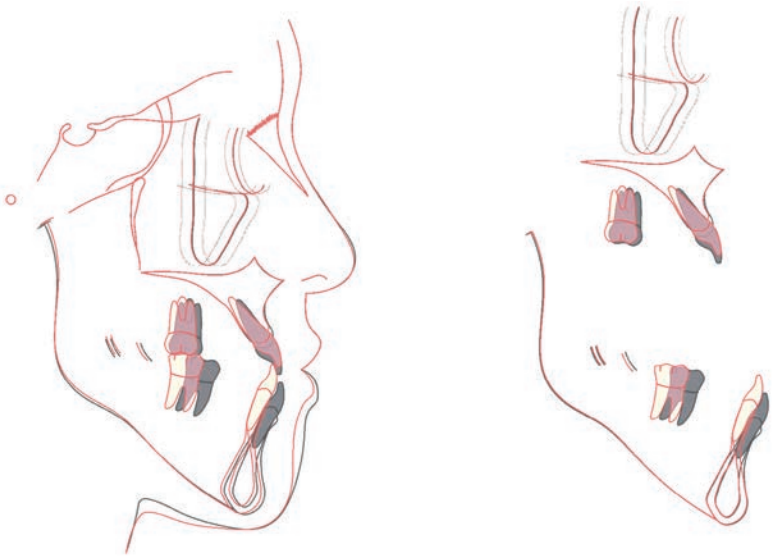


*Fig. 9:*
*Superimposed tracings of the pre-treatment (black) and post-treatment (red) cephalometric radiographs show the dental and skeletal changes during treatment. See text for details.*

*Fig. 10:*
*A tracing superimposed on a pre-treatment frontal (posterior-anterior view) cephalogram shows ~2-mm mandibular deviation to the left.*

## Diagnosis

Facial:

- Length: *Long tapered face in the frontal plane.*
- Protrusion: *Facial convexity was a relatively straight 3º (G-Sn-Pg'), which is within normal limits (WNL) despite midface deficiency and a long mandible (Table 1).*
- Symmetry: *Maxillary midline 1-mm right, chin deviation 2-mm left.*
- Smile: *Incisal exposure is WNL, but buccal corridors are excessive.*

upper dental midline deviated about 1-mm to the right, lower dental midline shifted 3-mm to the left, chin deviation to the left, and an excessively prominent mandible in the vertical dimension (*Figs. 1-3*). The intermaxillary relationship was a full cusp (*or more*) Class III molar and canine, bilaterally. Medical and dental histories were non-contributory, and there was no evidence of temporomandibular dysfunction (*TMD*). The morphology of the malocclusion was consistent with a specific scenario for airway compensation: 1. low tongue posture, 2. marginally competent lips, 3. anterior interdental soft tissue posture, and 4. mandibular midline deviation. The soft tissue functional problems resolved spontaneously as the dental alignment was corrected (*Figs. 4-6*), and no myofunctional therapy was needed. The cephalometric and panoramic radiographs document the pre-treatment condition (*Fig. 7*) and the post-treatment results (*Fig. 8*). The superimposed cephalometric tracings document treatment effects (*Fig. 9*).

| CEPHALOMETRIC | | | |
|---|---|---|---|
| SKELETAL ANALYSIS | | | |
| | PRE-Tx | POST-Tx | DIFF. |
| *SNA° (82°)* | 78° | 79° | 1° |
| *SNB° (80°)* | 80° | 79.5° | 0.5° |
| *ANB° (2°)* | -2° | -0.5° | 1.5° |
| *SN-MP° (32°)* | 46.5° | 47° | 0.5° |
| *FMA° (25°)* | 39.5° | 40° | 0.5° |
| DENTAL ANALYSIS | | | |
| U1 TO NA mm *(4 mm)* | 6 mm | 7 mm | 1 mm |
| *U1 TO SN° (110°)* | 113° | 119° | 6° |
| L1 TO NB mm *(4 mm)* | 5 mm | 4 mm | 1 mm |
| *L1 TO MP° (90°)* | 74° | 72.5° | 1.5° |
| FACIAL ANALYSIS | | | |
| E-LINE UL *(2-3 mm )* | -4 mm | -3.5 mm | 0.5 mm |
| E-LINE LL *(1-2 mm )* | -0.5 mm | -2 mm | 1.5 mm |
| Convexity:G-Sn-Pg' *(13°)* | 3.0° | 3.0° | 0° |
| %FH:Na-ANS-Gn *(53%)* | 63% | 63% | 0% |

Table 1: Cephalometric summary

Skeletal:

- Intermaxillary Relationship: *Retrusive maxilla (SNA 78°, SNB 80°, ANB -2°)*
- Mandibular Plane: *Excessive (SN-MP 46.5°, FMA 39.5°)*
- Vertical Dimension of Occlusion (*VDO*): *Excessive as evidenced by ANS-Gn 63% of Na-ANS-Gn dimension, compared to a norm of ~53%.*
- Symmetry: *Mandible is deviated to the left about 2-mm (Fig. 10).*

Dental:

- Classification: *Full-cusp Class III relationship (8-9mm) bilaterally*
- Overbite: *-5-mm (openbite)*
- Overjet: *-5-mm (anterior crossbite)*
- Posterior Crossbite: *UR4, UL4, UL5 in lingual version*
- Anomalies: *Upper peg-shaped lateral incisors (localized microdontia), retained UR deciduous canine, and buccal ectopic eruption of the succedaneous canine.*
- Symmetry: *Mandibular dental midline deviated 3-mm right*

The ABO Discrepancy Index (*DI*) was 62 as documented in the subsequent worksheet.

## Specific Objectives of Treatment

The treatment objectives were: 1. retract and posteriorly rotate the lower arch to correct the sagittal and vertical discrepancies in occlusion, 2. align arches to correct crossbites, and 3. maintain the VDO, and 4. open space to restore the peg lateral incisors.

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: *Maintain*
- Vertical: *Maintain*
- Inter-molar / Inter-canine Width: *Expand*

Mandibular Dentition:

- A - P: *Retract incisors and tip-back molars*
- Vertical: *Extrude incisors*
- Inter-molar / Inter-canine Width: *Constrict*

Facial Esthetics:

- Retract lower lip

## Treatment Plan

Use bilateral infrazygomatic crest (*IZC*) bone screws (*miniscrews*) to retract both arches and control extrusion of the upper posterior segment, due to the use of Class III elastics. Correct the maxillary midline with differential retraction force with IZC anchorage. Install a LR mandibular buccal shelf (*MBS*) bone screw to correct the lower midline deviation. Detail the occlusion with bracket repositioning, archwire adjustment and intermaxillary elastics, as needed. Retain the lower anterior segment with a spring retainer, and use a clear overlay retainer in upper arch.


*Fig. 11:*
*At one month (1M) into treatment, two 2x8-mm stainless steel (SS) IZC bone screws were installed buccal to the maxillary molars, and power chains were extended to the UR3 and UL4. Early light short elastics (ELSE) (Quail 2-oz) were applied bilaterally from the lower first premolars to the upper first molars. See text for details.*

## Appliances and Treatment Progress

An 0.022-in slot Damon Q® passive self ligating (*PSL*) brackets (*Ormco, Glendale, CA*) with standard torque were bonded on all teeth except the mandibular incisors. The latter were bonded with low torque brackets positioned upside down. All archwires and elastics were produced by the same manufacturer (*Ormco*), except as specified to the contrary. The initial archwires were 0.013-in CuNiTi. One month later, two 2x8-mm stainless steel (*SS*) IZC bone screws were installed, and bilateral elastic chains were attached from the miniscrews to the UR3 and UL4. Early light short elastics (*ELSE*) (*Quail 3/16, 2-oz*) were applied from the lower first premolars to the upper first molars bilaterally (*Fig. 11*). To correct the mandible deviation, a MBS miniscrew was inserted mesial side to the LR7 to anchor a power chain, applied to the LR first premolar (*Fig. 12*).

In the 2nd month of treatment, the lower arch wire was changed to an 0.016x0.022-in LH (*Low Hysteresis*) MEAW wire (*Tomy, Tokyo, Japan*). This LH MEAW with accentuated buccal curvature and a reverse curve of Spee facilitates retraction of lower posterior segments and opens space mesial to the first premolars to retract the anterior segment (*Fig. 13*). A Soarer-X® heat treatment device, for direct electric resistance heat treatment,[1] was used to make permanent bends in the super-elastic wire to upright mesially-inclined posterior teeth to achieve Class I relationship.[2] To prevent incisal flaring, the uprighting moment was "*activated*" with Class III intermaxillary elastics from IZC or MBS bone screws.


*Fig. 12:*
*At one month (1M) into treatment, immediately following the IZC bone screw placements, a MBS bone screw was installed buccal to the lower molars, and a power chain was extended to the LR3. See text for details.*

Five months into the treatment, short Class III elastics (*Fox 1/4, 3.5-oz*) were attached from the lingual surface of the upper first molars to the labial surface of the LR4 and LL3, while also expanding the upper inter-molar width (*Fig. 14*). Two months later, an 0.016x0.025-in SS archwire was used in the upper arch to expand the maxillary posterior segments to correct lingual cross-bite.

In the 6th month, a panoramic radiograph showed that the MBS bone screw was tilted mesially (*Fig. 15*). Since the screw was also loose, it was removed.

In the 9th month of the treatment, an 0.018x0.025-in LH archwire was used in the mandibular arch, and the upper archwire was replaced with an 0.016x0.025-in SS wire. An open coil spring was

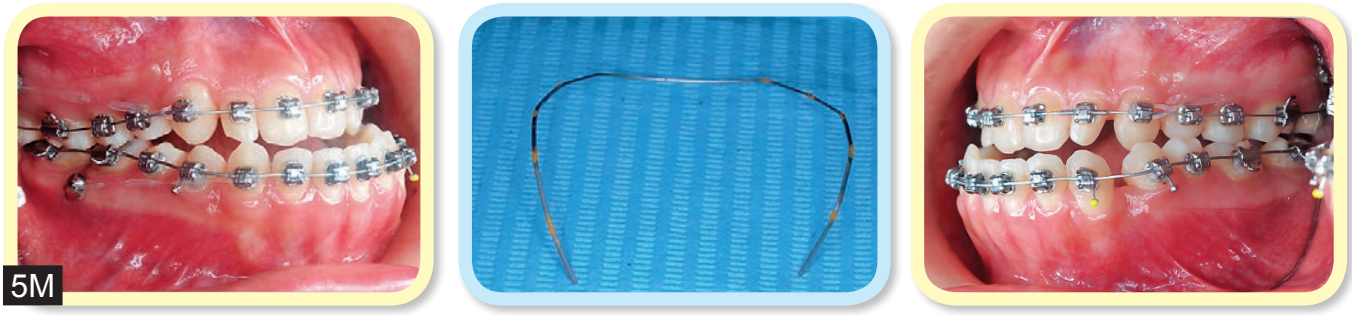



*Fig. 13: Five months (5M) into treatment, a LH (Low Hysteresis) MEAW wire (center) was installed. See text for details.*


*Fig. 14:*
*Short Class III elastics (Fox ¼, 3.5-oz) were attached from the lingual surface of the upper first molars to the labial surface of the LR4 and LL3.*

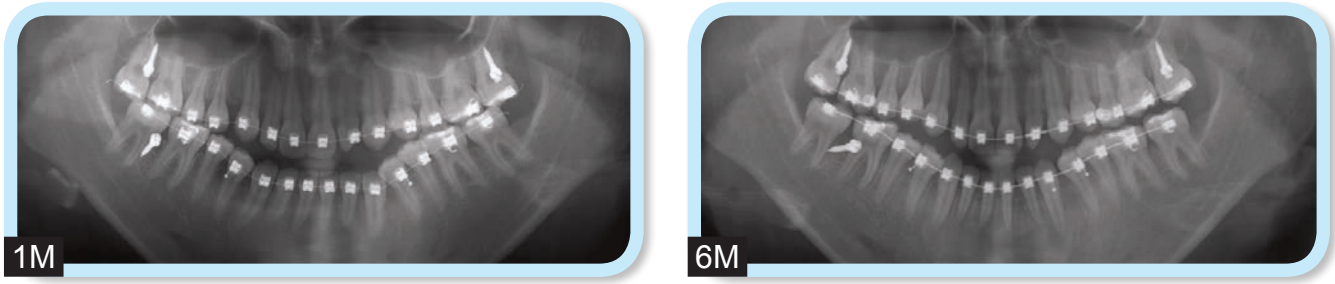



*Fig. 15:*
*A panoramic radiograph (1M) shows the position of the three E-A bone screws at the time of placement. Five months later, six months (6M) into treatment, the lower right MBS bone screw has tipped to the mesial.*

placed between UR1 and UR3 to open space to restore the peg lateral. At the same appointment, short Class III elastics (*Kangaroo 3/16, 4.5-oz*) were attached bilaterally from the LR4 and LL3 to the upper first molars (*Fig. 16*). In the 13th month, the midlines were coincident and bilateral upper peg-shaped lateral incisors were restored with composite resin (*Fig. 17*). The anterior crossbite was corrected in 15 months (*Fig. 18*). Bracket repositioning was performed repeatedly throughout treatment as indicated by sequential panoramic radiographs (*Fig. 19*). Archwires were adjusted to detail the occlusion. Bilateral torquing springs were placed on the upper lateral incisors to move the crowns palatally, as the maxillary arch was finished (*Fig. 20*).


*Fig. 16:*
*At nine months (9M), an open coil spring was placed between the UR1 and UR2 to open space to restore the peg-shaped incisor. Short Class III elastics (Kangaroo 3/16, 4.5-oz) were attached bilaterally from the upper first molars to LR4 and LL3.*


*Fig. 17:*
*The upper peg-shaped lateral incisors are shown at the start of treatment (1M). Five months later (6M) initial alignment is complete. In the 13th month (13M), the midlines were coincident and the peg-shaped lateral incisors were restored.*

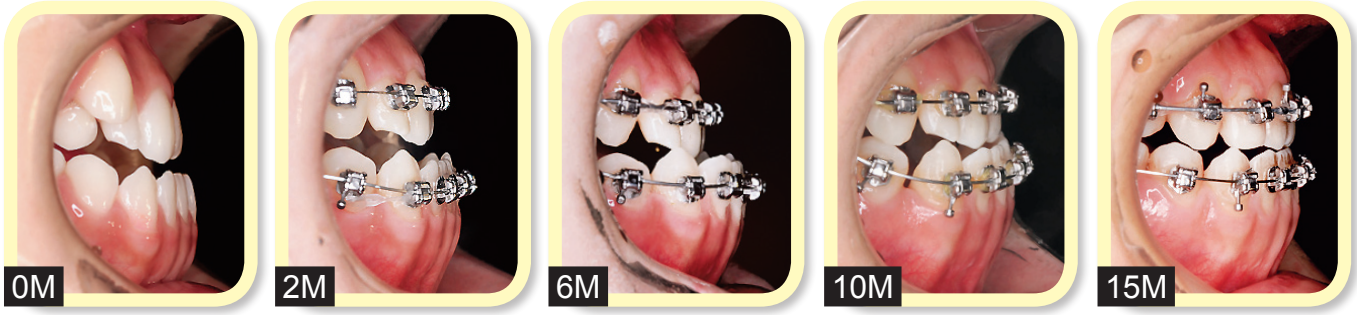



*Fig. 18: The anterior openbite correction is shown from the start of treatment (0M) up through 15 months (15M).*


*Fig. 19:*
*Bracket repositioning was performed as indicated by panoramic radiographs obtained at ten (10M) and seventeen (17M) months.*

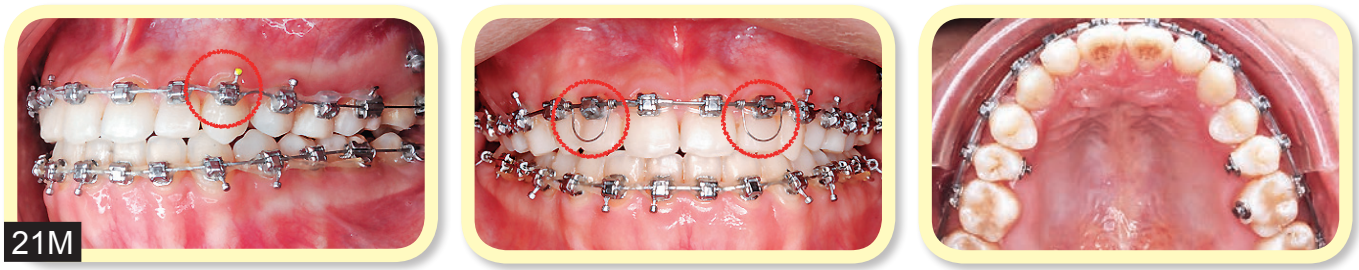



*Fig. 20:*
*At twenty-one (21M) months, orthodontic finishing was accomplished with archwire adjustments and torquing auxiliaries to move the UR2 and UL2 roots labially.*

After 23 months of active treatment, all fixed appliances were removed.

## Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: *Molars retracted*
- Vertical: *Incisors and molars intruded*
- Inter-molar / Inter-canine Width: *Expanded to correct crossbites*

Mandibular Dentition

- A - P: *Incisors and molars retracted*
- Vertical: *Incisors extruded*
- Inter-molar / Inter-canine Width: *Maintained*

**Facial Esthetics**: Lower lip was retracted

## Retention

A mandibular spring retainer was used on the lower

anterior segment. The upper arch was retained with a clear overlay appliance. The patient was instructed to wear it full time for the first 6 months and nights only thereafter. Instructions were provided for home hygiene as well as for maintenance of the retainers.

## Final Evaluation of the Treatment

Overall, there was a substantial improvement in facial esthetics, dental alignment and functional occlusion. The ABO Cast-Radiograph Evaluation[3] score was 17 points. There were minor discrepancies in two categories: marginal ridges (*6 points*) and occlusal relationships (*5 points*). The mandibular second molars were tipped distally because there was inadequate root-distal moment in the archwire, which resulted in marginal ridges discrepancies in the posterior segments (*Fig. 21*). The Pink & White dental esthetic score was 2 points (*Worksheet 3*),[4] as documented later in this report.

Alignment and restorative recontouring of the upper anterior lateral incisors, along with retraction of the lower dentition and correction of the dental midline deviation helped to resolve the patient's chief complaints. However, long-term retention is necessary to prevent relapse.

## Discussion

Prevalence of Class III malocclusion ranges from 0.8 to 4.0% in Caucasians, but its much more prevalent, about 12-13% in Chinese and Japanese populations.[5] The etiology of Class III malocclusion may be genetic and/or environmental.[6-9] Incisal interference may be compensated by protruding the mandible to achieve a more functional occlusion.[6] Compensations for breathing problems (*sleep apnea*) are well documented.[7-15] Airway compromise may be compensated by forward posturing the mandible to achieve increased airway volume.[7,10,11] A low tongue posture, with soft tissue positioned between the teeth, is associated with openbite.[8,9]

Etiology for the present malocclusion is probably genetic and environmental. Midface deficiency (*SNA 78º, ANB -2º*) is a genetic trait that is often associated with airway problems.[8-10] Typical airway

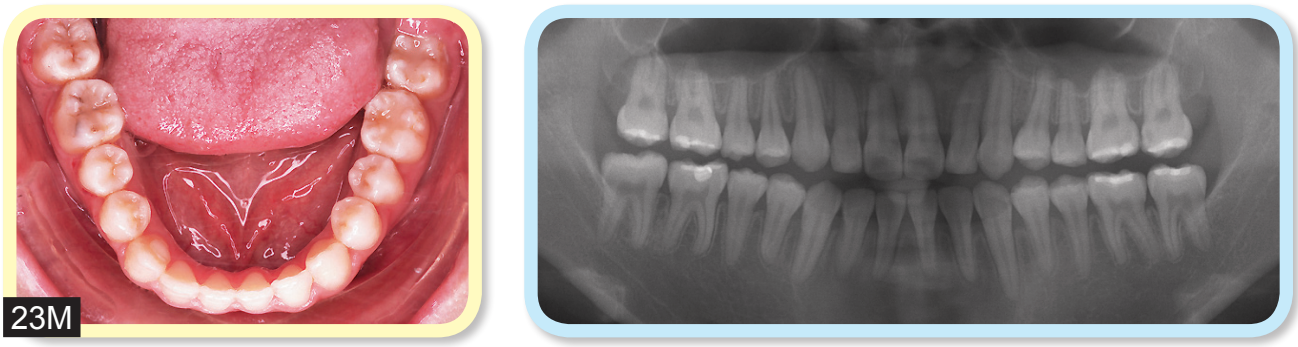



*Fig. 21:*
*At twenty-three months (23M), the mandibular second molars are tipped distally, as documented in a panoramic radiograph to the right. See text for details.*

compensations (*environmental effects*) are forward positioning of mandible, low tongue posture, and posterior rotation of the mandible to increase the VDO.[8-11] The latter results in a steep mandibular plane (*39.5º*), constricted maxillary arch, and may be associated with anterior openbite if there is a soft tissue (*lower lip and tongue*) posture between the incisors. Sleeping in a lateral head position, i. e. one side of the face resting on the pillow, is a natural compensation that opens the airway.[12,13] However, it is well known that habitual sleeping on one side distorts craniofacial morphology.[15] Thus, the etiology of the present malocclusion appears to be airway compensation, resulting in a long face with mandibular deviation, superimposed on genetic predisposition for midface deficiency.

Asymmetric, skeletal Class III malocclusion with an openbite is one of the most challenging malocclusions to treat and retain. The Lin 3-Ring Diagnosis System[16] is an effective method for differential diagnosis to determine which Class III malocclusions are favorable candidates for conservative treatment. Interradicular (*I-R*) miniscrews[17-18] have limitations for management of complex malocclusions. On the other hand, E-A bone screws do not interfere with the path of tooth movement,[16] so they have greatly expanded the scope for conservative management of severe Class III openbite malocclusions.[19-21]

The infrazygomatic crest (*IZC*) is an ideal maxillary site for the placement of orthodontic miniscrews to retract both arches. Assuming the center of rotation for the whole maxillary arch is near the apexes of the maxillary 1st and 2nd premolar roots, a distal force from an IZC bone screw produces a clockwise rotation of the maxillary occlusal plane (*Fig. 22*), which is helpful for correcting an openbite.

The entire mandibular arch can be retracted with the MBS miniscrews. I-R miniscrews are inappropriate for full arch retraction, because they interfere with

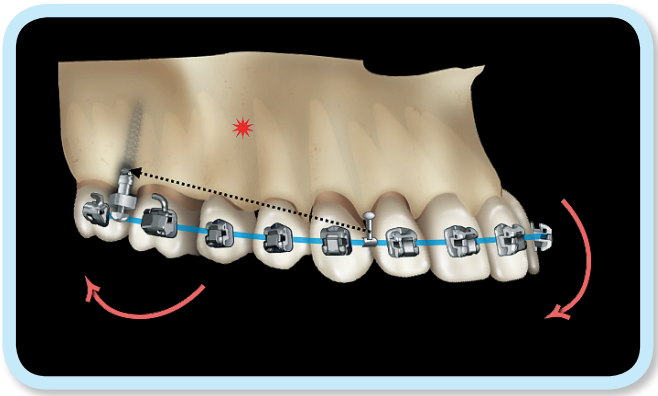


*Fig. 22:*
*The apparent center of rotation (red asterisk) for the right posterior segment of the maxilla is estimated at around the apexes of the maxillary 1st and 2nd premolar roots. The line of force from the bone screw to the attachment on the archwire mesial to the canine (dotted black arrow) tends to rotate the entire maxillary arch (red curved arrows). Illustration is by courtesy of Dr. Rungsi Thavarungkul.*

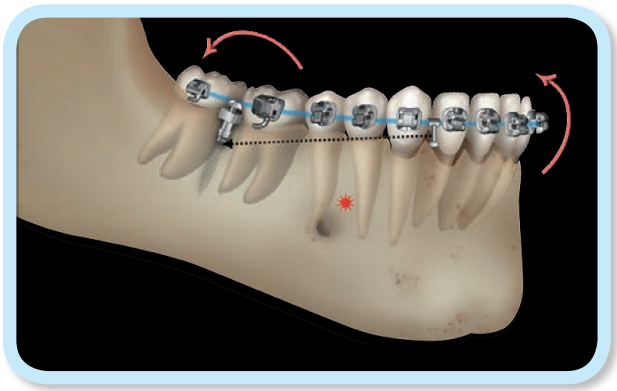


*Fig. 23:*
*Posterior rotation (red arrows) of the lower arch is produced by a force from the MBS bone screw to the attachment on the archwire mesial to the cuspid (black dotted arrow). The presumed center of rotation (red asterisk) is near the apices of the roots of the premolars. Illustration is by courtesy of Dr. Rungsi Thavarungkul. However, the actual axis of rotation for the lower arch for these mechanics is through the midroot area of the canines, as shown by FEA of CBCT images. See Roberts et al. 2015 (reference 13) for details.*

root movement.[16,18] The limitation of the MBS bone screw for retraction of buccal segments is an anatomic restraint. In the lower arch, there must be adequate space between the terminal molar and the external oblique ridge of the ascending ramus. The axis of rotation, for retracting the the lower arch as a segment with MBS bone screws, is through the mid-root area of the cuspids bilaterally.[19] This result was calculated with finite element assessment (*FEA*) of cone-beam computed tomography (*CBCT*) images, and is consistent with the cephalometric results of treatment. This approach appears to be more accurate than 2D estimations or photoelastic stress analysis (*Fig. 23*).[22] The biomechanics of MBS bone screw retraction tend to posteriorly rotate the mandibular arch and close the VDO.[19] A line of force to the lower canines from IZC bone screw anchorage retracts the mandibular arch as a segment but failed to close the VDO because there is little or no intrusion of the mandibular molars.[19] These data are consistent with the present clinical results (*Figs. 8 and 9*). Retracting the mandibular arch with a flexible archwire results in distal tipping of the terminal molar (*Fig. 8*). This problem is best prevented or corrected by repositioning the terminal molar bracket or adjusting the archwire to deliver a root distal moment.

MBS bone screws are 99% successful compared to about 85% for IZC bone screws.[15] Table 2 is a comparison of MBS and IZC bone screws relative to ease of use, compliance requirements and clinical effects. A more detailed discussion comparing the biomechanics of MBS and IZC bone screws for mandibular arch retraction is published.[19]

Asymmetries are classified according to the structures involved as: a. dental, b. skeletal, c. muscular and d.

**Comparison Between IZC & BS Screws**

| | IZC Screw | Buccal Shelf Screw |
|---|---|---|
| Self Drilling | Easy | More difficult<br>Very difficult for extra-radicular |
| Results of Class III Elastics | More lower anterior extrusion | Less lower anterior extrusion |
| Compaince | Need | No need |
| Opposite Arch Distalization | CIII elastics on the lower distalization | CII to distalize upper seems not as efficient |
| Same Arch Distalization | Easy | Easy |
| Lower Molar Intrusion | Impossible | Easier |

Table 2: Comparison of IZC and buccal shelf (BS) bone screws for retraction of the maxillary and mandibular arches.

functional asymmetries. Diagnosing facial and dental asymmetries requires a thorough clinical examination and radiographic survey to determine the extent of the soft tissue, skeletal, dental and functional components.[23] MBS and IZC bone screws are effective anchorage for managing dental midline discrepancies because they can be placed in the E-A posterior areas of both arches. The MBS bone screw failed after 5 months (*Fig. 15*) but still provided adequate anchorage for lower midline correction.

Peg-shaped maxillary lateral incisors are a genetic problem related to hypodontia.[24] The prevalence of small lateral incisors (*localized hypodontia*) is 5.6% compared to 1.3% for peg-shaped laterals, the problems are slightly more common in females.[25] Peg-Laterals are usually managed with tooth movement to correctly position adjacent teeth followed by restoration of normal incisor form, with composite resins, porcelain veneers, or crowns.

Bracket positioning and repositioning as needed are key to precise finishing. The ideal bracket position criteria involve: 1. smile arc, 2. mutually protected occlusion, 3. marginal ridges and contacts, 4. symmetry, 5. transition from anterior incisal edges to buccal cusps in the posterior segments, and 6. torque control. Studying and perfecting bracket positions results in the most efficient path to an optimal alignment.[26,27] Despite the complexity of the malocclusion (*DI=62*), this method produced a pleasing result with only 23 months of active treatment.

Stability of the correction is expected because: 1. the pharyngeal airway of adults tends to increase as the lymphoid tissue of the tonsils and adenoids atrophies,[28,29] and 2. the patient is not overweight. Sleep apnea in adults is strongly associated with obesity.[30] Correction of a malocclusion related to airway compensation tends to be more stable in patients who are not overweight.

## Conclusion

- Efficient management of severe skeletal malocclusion is best managed by establishing the etiology to plan precise mechanics to reverse the developmental pattern of the problem(s).
- E-A bone screw anchorage outperforms all other forms of mechanics, with or without orthognathic surgery, for correction for severe Class III skeletal malocclusion, complicated with anterior openbite and multiple crossbites.
- Compliance with the intermaxillary elastics was an essential component for the efficient correction of this severe malocclusion.
- Upper peg-shaped lateral incisors are a substantial dental esthetic problem requiring precise orthodontic positioning of the anterior segments, followed by restoration of normal form and function of the affected teeth.
- This difficult malocclusion (*DI=62*) was treated to an excellent alignment (*CRE=17*) in 23 months. The patient and clinician were pleased with the near ideal esthetics and function.

## Acknowledgment

Thanks to: 1. Mr. Paul Head for proofreading this article, 2. Dr. Leslie Yen Peng Chen's sharing of the use of LH wire for the MEAW method, and Dr. Jeng-Feng Hwang for excellent composite restoration of peg-shaped lateral incisors.

## References


1. Fujio M, Masakuni M, Yoshiaki O. Japanese NiTi alloy wire: use of the direct electric resistance heat treatment method. Europen J of Orthod 1988;10(3):187-191.
2. Hisano M1, Chung CR, Soma K. Nonsurgical correction of skeletal Class III malocclusion with lateral shift in an adult. Am J Orthod Dentofacial Orthop 2007 Jun;131(6):797-804.
3. American Board of Orthodontics. Grading System for Dental Casts and Panoramic Radiographs. The American Board of Orthodontics Website; 2012.
4. Su B. IBOI Pink & White esthetic score. Int J Orthod Implantol 2013;28:80-85.
5. Ishii N, Deguchi T, Hunt N. Craniofacial difference between Japanese and British Caucasian females with a skeletal class III malocclusion. Eur J Orthod 2002;24:493–9.
6. Ngan P, Hu AM, Fields HW. Treatment of Class III problems begins with differential diagnosis of anterior crossbites. Pediatr Dent 1997;19(6):386-95
7. Iwasaki T, Hayasaki H, Takemoto Y, Kanomi R, Yamasaki Y. Oropharyngeal airway in children with Class III malocclusion evaluated with cone-beam computed tomography. Am J Orthod Dentofacial Orthop 2009;136:318. e. 1-318. e. 9.
8. Proffit WR. Equilibrium theory revisited: factors influencing position of the teeth. Angle Orthod 1978;48(3):175-86.
9. Yamaguchi H, Sueishi K. Malocclusion associated with abnormal posture. Bull Tokyo Dent Coll 2003;44(2):43-54.
10. Pirilä-Parkkinen K, Pirttiniemi P, Nieminen P, Tolonen U, Pelttari U, Löppönen H. Dental arch morphology in children with sleep-disordered breathing. Eur J Orthod 2009;31(2):160-7.
11. Lennartsson F, Nordin P, Wennergren G. Teaching parents how to prevent acquired cranial asymmetry. J Pediatric Nurs 2016;31(4):e252-61.
12. Stuck BA, Maurer JT. Recent developments in the diagnosis and treatment of obstructive sleep apnea: English version. HNO 2016 Jun 14. [Epub ahead of print]
13. Zicari AM, Duse M, Occasi F, Luzzi V, Ortolani E, Bardanzellu F, Bertin S, Polimeni A. Cephalometric pattern and nasal patency in children with primary snoring: the evidence of a direct correlation. PLoS One 2014;9(10):e. 111675.
14. Lee CH, Kim DK, Kim SY, Rhee CS, Won TB. Changes in site of obstruction in obstructive sleep apnea patients according to sleep position: a DISE study. Laryngoscope 2015 Jan;125(1):248-54.
15. Lin JJ. Creative Orthodontics Blending the damon system & TADs to manage difficult malocclusions. 2nd ed. Taipei: Yong Chieh; 2010.
16. Park HS, Kwon TG, Sung JH. Nonextraction treatment with microscrew implants. Angle Orthod 2004;74(4):539-549.
17. Ravesloot MJ, Frank MH, van Maanen JP, Verhagen EA, de Lange J, de Vries N. Positional OSA part 2: retrospective cohort analysis with a new classification system (APOC). Sleep Breath 2016;20(2):881-8.
18. Lin JJ. Treatment of severe class III with buccal shelf mini-screws. News & Trends in Orthodontics 2010 Apr;18:4-15.
19. Roberts WE, Viecilli RF, Chang CH, Katona TR, Paydar NH. Biology of biomechanics: finite element analysis of a statically determinate system to rotate the occlusal plane for correction of skeletal Class III malocclusion. Am J Orthod Dentofacial Orthop 2015;148:943-955.
20. Lee MC, Lin JJ, Roberts WE. Hyperdivergent Class III openbite malocclusion treated conservatively. Int J Orthod Implantol 2012;28:4-18.
21. Yeh HY, Lin JJ, Roberts WE. Conservative adult treatment for severe Class III, openbite malocclusion with bimaxillary crowding. Int J Orthod Implantol 2014;34:12-25.
22. Nakamura A, Teratani T, Itoh H, Sugawara J, Ishikawa H. Photoelastic stress analysis of mandibular molars moved distally with the skeletal anchorage system. Am J Orthod Dentofacial Orthop 2007;132:624-629.
23. Bishara SE, Burkey PS, Kharouf JG. Dental and facial asymmetries: a review. Angle Orthod 1994;64(2):89-98.
24. Amin F, Asif J, Akber S. Prevalence of peg laterals and small size lateral incisors in orthodontic patients-a study. Pakistan Oral & Dental J 2011;31(1):88-91.
25. Alvesal L, Portin P. The inheritance pattern of missing, peg shaped and strongly mesiodistally reduced upper lateral incisors. Acta Odontol Scand 1969;27:563-75.
26. Pitts T. Begin with the end in mind: Bracket placement and early elastics protocols for smile arc protection. Clinical impressions 2009;17(1):4-13.
27. Pitts T, Huang S. Tom Pitt's Secrets of Excellent Finishing. News & Trends in Orthodontics 2009;14:6-23.
28. Coccaro PJ, Coccaro PJ Jr. Dental development and the pharyngeal tissue. Otolaryngol Clin North Am 1987;20(2):241-57.
29. Mislik B, Hänggi MP, Signorelli L, Peltomäki TA, Patcas R. Pharyngeal airway dimensions: a cephalometric, growth-study-based analysis of physiological variations in children aged 6–17. Our J Orthod 2014;36(3):331-339.
30. Schwartz AR, Patil SP, Laffan AM, Polotsky V, Schneider H, Smith PL. Obesity and obstructive sleep apnea: pathogenic mechanisms and therapeutic approaches. Proc Am Thorac Soc 2008 Feb;5(2):185-92.


# Discrepancy Index Worksheet

**TOTAL D.I. SCORE** 62

## 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 = 16

## 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 = 2

## CROWDING (only one arch)

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

Total = 1

## OCCLUSION

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

Total = 9

## LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 3

## BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

## CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP
≥ 38° = 2 pts.
Each degree > 38° 1 x 2 pts. = 2

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

1 to MP ≥ 99° = 1 pt.
Each degree > 99° _____ x 1 pt. = _____

Total = 8

## OTHER (See Instructions)

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

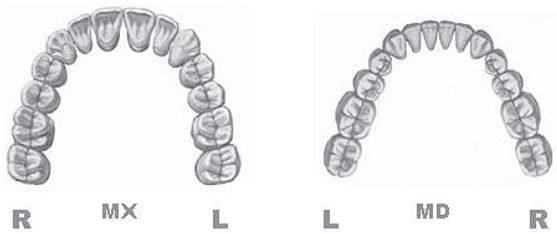
Total = 6

# Cast-Radiograph Evaluation

Total CRE Score 17

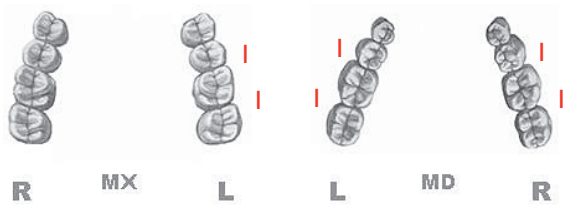
### Alignment/Rotations

0



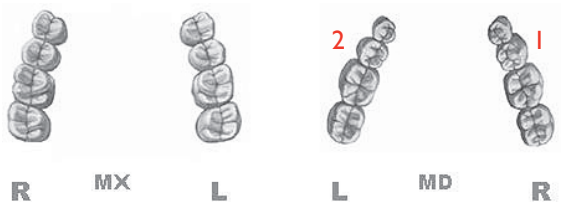

### Marginal Ridges

6




### Buccolingual Inclination

3

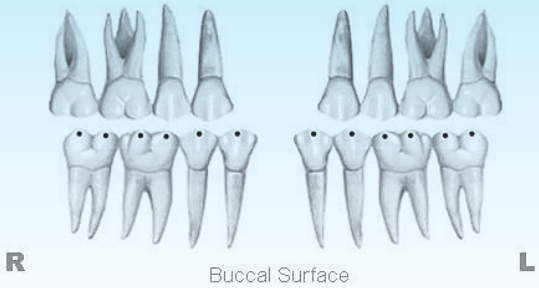



### Overjet

2


### Occlusal Contacts

0

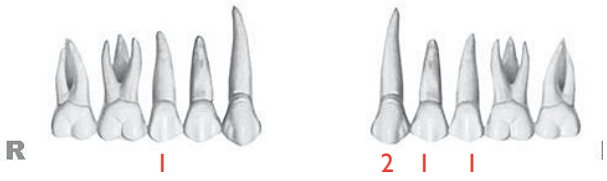



Buccal Surface


Lingual Surface

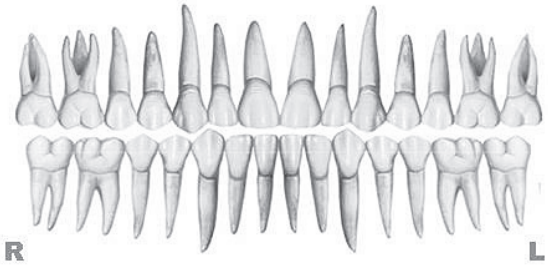
### Occlusal Relationships

5



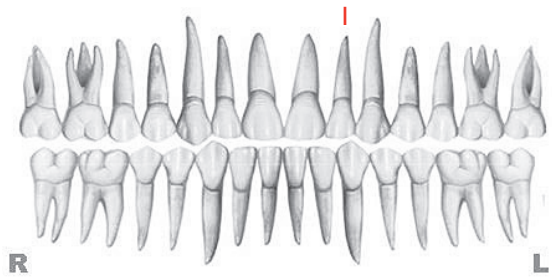

### Interproximal Contacts

0




### Root Angulation

1



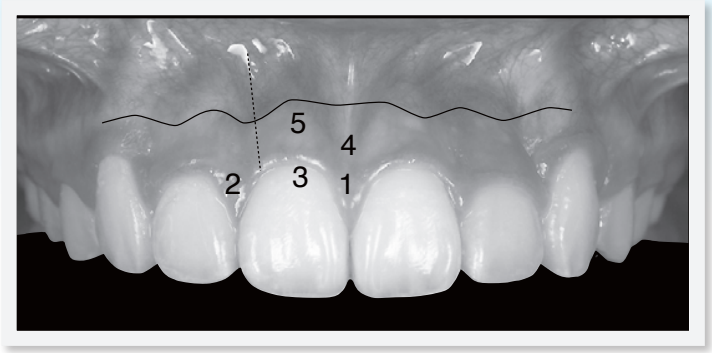

***INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.***

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

**Total Score: =** 2

## 1. Pink Esthetic Score

*Total =* 1

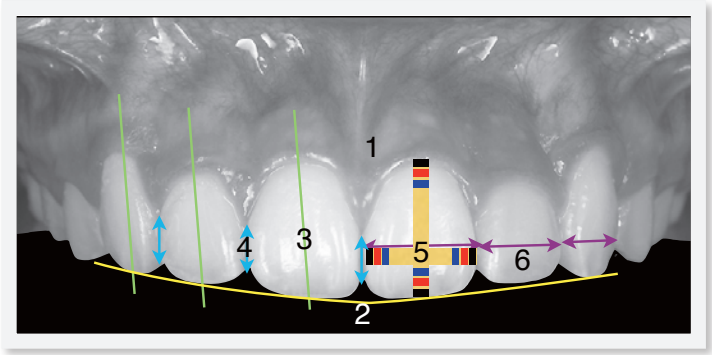



| | | | |
|---|---|---|---|
| 1. M & D Papillae | 0 | 1 | 2 |
| 2. Keratinized Gingiva | 0 | 1 | 2 |
| 3. Curvature of Gingival Margin | 0 | 1 | 2 |
| 4. Level of Gingival Margin | 0 | 1 | 2 |
| 5. Root Convexity ( Torque ) | 0 | 1 | 2 |
| 6. Scar Formation | 0 | 1 | 2 |

| | | | |
|---|---|---|---|
| 1. M & D 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 =* 1




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

2017 iAOI Symposium

Introducing

# TMJ Orthodontics in the Damon System

Dr. Elizabeth Menzel

B.CH.D.University Stellenbosch. Orthodontic training at the University of Frankfurt, training in the practice of Dr. König-Toll Kronberg, Dr. Toll in Bad Soden, Germany and with Prof. Axel Bumann in Kiel with an emphasis on jaw diseases and how to treat them. Works in a practice in Herrsching am Ammersee, Germany since 15 years.

She has also worked in Great Britain and Vilnius, Lithuania for the orthodontic treatment of patients with severe jaw diseases. Internationally recognized lecturer since 2006. Damon user since 2003.

## 2017 / 05 / 21 Sun

Location：National Chiao Tung University Library-B1 International Conference Hall

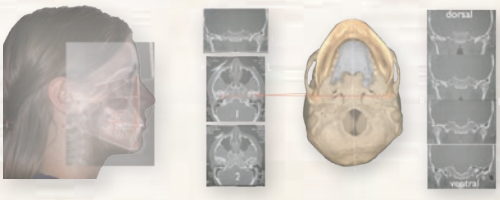
No.1001, Daxue Rd., East Dist., Hsinchu City, Taiwan (新竹市東區大學路1001號)

- Diagnostic classification with treatment examples
- Understanding facial growth and the significance of the D-Gainer
- Asymmetries and the effect on the mandibular position in Class II Subdivision cases
- A dysfunctional oral system: open bite

| | By 2017/05/01 | | After 05/01 | |
|---|---|---|---|---|
| | Member | Non-member | Member | Non-member |
| Registration | USD 200 | USD 250 | USD 250 | USD 300 |

- Payment: wire transfer (no credit card)

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




Cancellation policy:
Cancellation before March 1 is subject to 10% of cancellation fees or 30% after March 1.

Organized by: iAOI International Association of Orthodontists and Implantologists

Co-organized by: Yong Chieh Enterprise Co., Ltd.
Taiwan Association of Orthodontists
Taiwan Academy of Craniomandibular Disorders
Taiwan Orthodontic Society

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

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.

2017

# Implant Forum 植牙論壇

Implant Technique + DDx + Fundamentals

當 矯正
遇上 植牙

## 2017年03月24日起

每月底週五，上午9:00-12:00

現今已是牙科跨領域整合治療的時代，結合矯正、植牙、牙周與補綴等各科，讓治療成果臻於完美是我們追求的目標。

2017年的植牙論壇，課程規劃將再進化：除了美國矯正學會院士張慧男醫師，美國牙周病學會院士邱上珍醫師，台灣矯正植牙學會院士蘇筌瑋醫師將繼續帶領學員進行臨床案例報告與期刊的討論與分析外，也邀請了許多經驗豐富的醫師進行特別演講。其中，特別演講嘉賓包含前台中榮總植牙中心與牙周病科特約主治醫師方鐘鼎醫師，將教導我們仔細分析上顎竇處理的相關議題；還有以嚴謹，細緻治療聞名的中華審美牙醫學會的理事何鳳娟醫師，將指導我們如何精巧的處理軟組織；以及在澎湖開業非常成功的周暘齡醫師，將分享自身成功的經驗，從前端的口掃到後端的CAD-CAM設備、助理的訓練與技師的配合等，帶領我們進入數位牙科的時代。另外，長期指導我們的大家長：前三軍總醫院口腔外科主任、哈佛大學資深研究員的張燕清主任，將繼續提醒我們在植牙領域的種種陷阱和特別考量。


2017年的植牙論壇課程，精采絕倫。希望經由這每月一次的進修，讓您全方位的有效率學習，並在面對各式的臨床案例時，能游刃有餘，得心應手。誠摯的邀請您參與2017年植牙論壇！

03-5735676 #201 陳建名先生
info@newtonsa.com.tw
新竹市建中一路25號2樓（金牛頓藝術科技）

# Protrusive Partially Edentulous Malocclusion: Early Loss of a Lower First Molar, Implant Site Development and VISTA Soft Tissue Augmentation


## Abstract

***Introduction***: *A 29yr female presented with chief complaints of irregular teeth and a protruded chin. The upper right (UR) lateral incisor (#7) was congenitally missing and #10 was a peg lateral. The lower left (LL) first molar was apparently lost in childhood due to a developmental problem: molar-incisor hypoplasia (MIH).*

***Diagnosis & Etiology***: *The probable etiology of the anterior crossbite and midline deviation was the collapse of the left posterior dentition when the second deciduous molar was lost (~age 10-12yr). When there is a loss of posterior occlusal stops in the mixed dentition, children often posture anteriorly to achieve a more comfortable occlusion. Teeth #12 and 15 were subsequently lost to caries, which resulted in additional atrophic extractions sites.*

***Treatment & Results***: *The patient preferred conservative treatment with minimal surgery, and no temporary anchorage devices (TADs). Following extraction of an endodontically treated LR5 (#29), both arches were orthodontically retracted for space closure and correction of lip protrusion. The upper left second premolar (UL5) (#13) was translated anteriorly to create an implant site. Subsequently an osseointegrated fixture was placed in the prepared site, along with a simultaneous soft tissue augmentation procedure via the vestibular incision subperiosteal tunnel access (VISTA) technique. The UR canine (UR3) and first premolar (UR4) were reshaped and substituted for the missing lateral incisor and adjacent canine.*

***Outcomes***: *Following 42 months of interdisciplinary treatment, this difficult malocclusion with a Discrepancy Index (DI) of 27 was treated to an excellent cast-radiograph (CRE) score of 22. However, the Pink & White dental esthetics score was a relatively high 8 because of esthetic zone problems secondary to a midline discrepancy, that occurred because the patient declined miniscrew anchorage. (Int J Orthod Implantol 2017;45:24-56)*



***Key words:***
*VISTA, implant site development, connective tissue graft, tuberosity graft, root coverage procedure, patient restrictions on treatment*


## Introduction

This case report contributes to a series of challenging malocclusions that were treated with an interdisciplinary approach.[1-16] They compose a variety of inherited and acquired disorders, such as skeletal discrepancies,[1-3] congenitally missing teeth, and[4,5] tooth size to arch length discrepancies.[6-8] A surprisingly common etiological factor is the early loss of permanent mandibular first molars (*lower 6s*), which is manifest as the loss of a posterior centric stop(*s*) when the second deciduous molars exfoliate (*~age 10-12yr*). Unilateral or bilateral occlusal instability may precipitate mandibular protrusion or retrusion to achieve more

**Dr. Chris Lin,**
*Associate editor, International Journal of Orthodontics & Implantology (Left)*

**Dr. Chris Chang,**
*Founder, Beethoven Orthodontic Center*
*Publisher, International Journal of Orthodontics & Implantology (Center)*

**Dr. W. Eugene Roberts,**
*Editor-in-chief, International Journal of Orthodontics & Implantology (Right)*

*Fig. 1: Pre-treatment facial photographs*

*Fig. 2: Pre-treatment intraoral photographs*

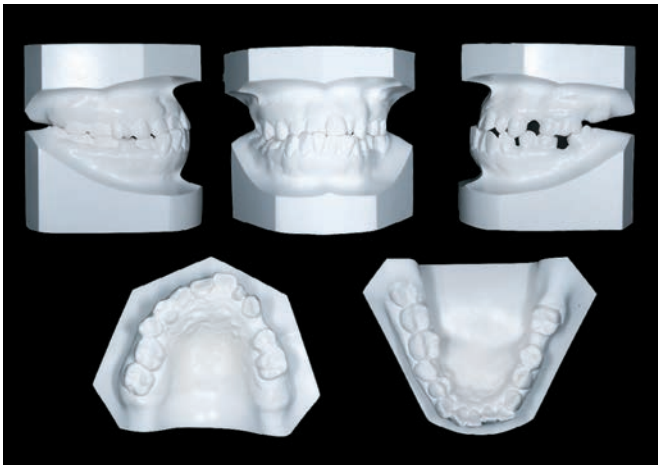
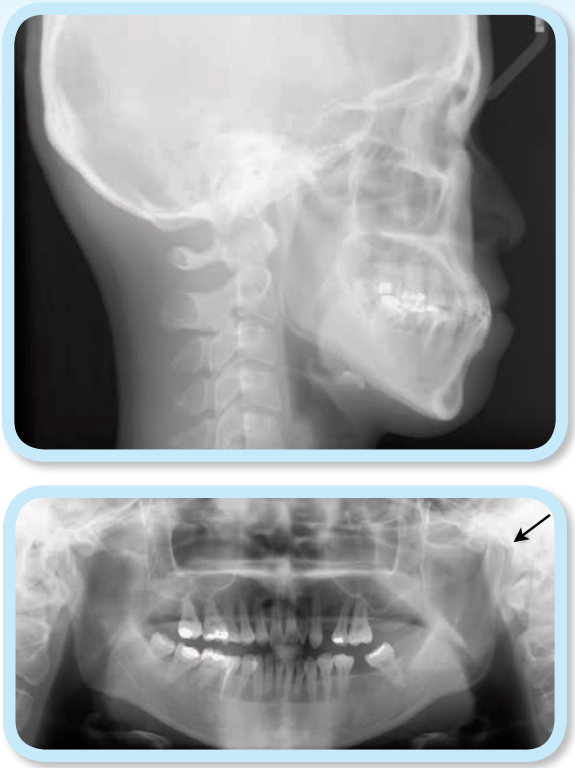


*Fig. 3: Pre-treatment study models (casts)*

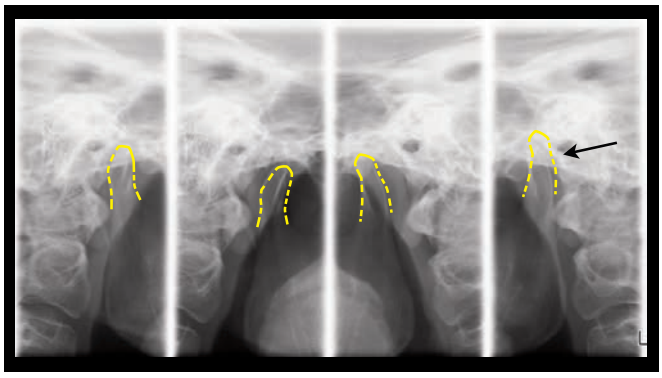
comfortable mastication. This acquired malocclusion may lead to a variety of dentofacial problems, such as orofacial asymmetry, mandibular protrusion or retrusion, and a deep curve of Spee.[1,9–11]

The present patient presented with a complex malocclusion (*Figs. 1-3*) featuring atrophic extraction sites (*Fig. 4*), multiple missing teeth (#*12, 15 and 19*) (*Fig. 5*), and asymmetric length of the mandibular condyles (*Fig. 6*). The missing lower left first molar (#*19*) was associated with a contralateral deviation of the mandible into anterior crossbite. Acquired characteristics of the complex malocclusion required a careful diagnostic assessment. Treatment planning was challenging because the orthodontic options were limited by restrictions the patient imposed on temporary anchorage devices (*TADs*), bone grafting and orthognathic surgery.

*Fig. 4:*
*Posterior extraction sites are atrophic edentulous spaces.*
*Left: Maxillary second premolar (#12)*
*Right: Mandibular left first molar (#19)*



■ *Fig. 5:*
*Pre-treatment radiographs: cephalometric (upper) and panoramic (lower), note the left condyle (arrow) is ~1-cm longer than the right side.*



■ *Fig. 6:*
*The left two views are the Md condylar position on the right side in the closed and open positions, respectively. The right two views are the Md condylar position on the left side in the open and closed positions, respectively. The left condyle (arrow) appears to be longer than the right condyle, suggesting the left condyle was exposed to an environmental challenge such as anterior posturing of the Md.*

**Etiology**: This is a critical consideration for all complex malocclusions. Crowding may be secondary to inadequate development of arch width[12,13] or an acquired crossbite.[7,8,10] Functional problems may result in aberrant physiologic biomechanics that contribute to progressive dental and skeletal malocclusion.[1-11] Determining the etiology of the disorder is an important prerequisite for designing an appropriate treatment plan. Developmental (*acquired*) malocclusion is most effectively treated by reversing the etiology that produced the problem(s). Many acquired skeletal malocclusions respond well to orthodontic anchorage, provided by extra-alveolar temporary anchorage devices (*E-A TADs*), but true genetic anomalies often require orthognathic surgery[14] or camouflage correction.[15] In addition, many patients have strong preferences for avoiding surgery, TAD anchorage, and may even decline extraction of periodontally compromised teeth.[16]

**Periodontium**: It is important to carefully assess the health of the periodontium to determine the potential for conservative correction, i. e. without extractions or orthognathic surgery. Periodontal evaluation revealed atrophic extraction sites (*Fig. 4*), and a loss of alveolar crest height in the mandibular anterior region, that was noted in the initial panoramic radiograph (*Fig. 5*). Poor hygiene was evidenced by extensive plaque deposits (*red stain*) noted interproximally throughout the mouth (*Figs. 7 and 8*). In addition, there were periodontal concavities (*blue arrows in Fig. 8*) on the buccal surfaces of the UL edentulous sites before (*0M*), as well as after mesial translation of tooth #13 to create

an implant site mesial to the molar. Adequate bone was produced for an implant. After mesial translation of tooth #13, mild soft tissue recession was noted, which leads to the further soft tissue augmentation.

**Skeletal Correction**: Optimal correction of skeletal malocclusion such as anterior crossbite can be achieved by changing the relationship between the maxilla and mandible with orthognathic surgery or TAD anchorage. Patients often decline orthognathic surgery because of post-operative morbidity and lack of insurance coverage. Extra-alveolar (*E-A*) TAD anchorage is an attractive option for conservative management of skeletal malocclusions.[17] However, patients may decline skeletal correction with either surgery or TADs, and opt for camouflage orthodontics[15] or conservative interdisciplinary treatment.

**Orthodontics and Implants**: There is a natural interdisciplinary connection between orthodontics and implants, with respect to anchorage and preprosthetic alignment. This link is the underlying premise of the International Association of Orthodontics and Implantology and the current publication International Journal of Orthodontics and Implantology (*IJOI*). Both osseointegrated[18] and nonintegrated[2,4,8,17] fixtures can be used as anchorage to correct malocclusion. On the other hand, orthodontics can be utilized to optimally align the dentition for implants and create implant sites. Depending on the severity of the malocclusion and the location of the edentulous areas, some partially edentulous malocclusions are adequately resolved with orthodontic space closure, but large

*Fig. 7:*
*The maxillary and mandibular midlines are both shifted to the right, suggesting occlusal developmental problems. See text for details.*

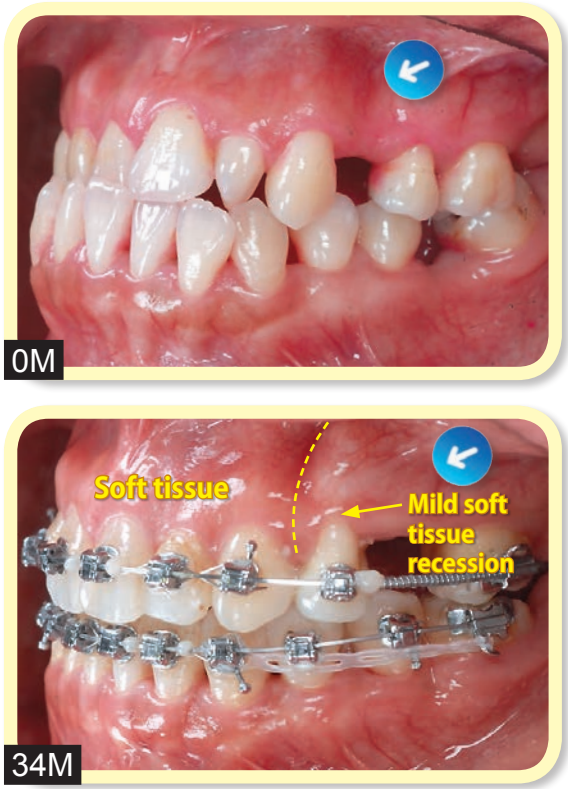



*Fig. 8:*
***0M**: At the start of treatment, an edentulous space is associated with an atrophic concavity (blue arrow) on the buccal surface of the maxillary alveolar process. Note that plaque staining (red) is noted between teeth throughout the mouth.*
***34M**: After mesial translation of the second premolar (#13) to the first premolar position #12, the concavity on the buccal surface of the maxilla is no longer evident (blue arrow).*

and asymmetric edentulous spaces usually require implant-supported prosthetics. Patients increasingly regard implants as a desirable alternative to conventional prosthetics, but that option may be more complex and expensive if there is inadequate bone and/or soft tissue at the implant site. Bone grafts are often required to increase the height and width of the ridge. In addition, soft tissue augmentation and sinus lift procedures may be necessary. To avoid misunderstandings, in addition to obtaining a proper informed consent, the pros and cons of all surgical and prosthetic options should be carefully discussed with the patient.

## Diagnosis, Etiology and Treatment Planning

A 29-year-old female sought interdisciplinary consultation for a crowded irregular dentition and a protruded chin (*Fig. 1*). The UL2 (#*10*) was a peg-lateral, and there were multiple missing teeth: UL4 (#*12*), UL5 (#*15*), and LL6 (#*19*) (*Figs. 2 and 3*). The upper arch was constricted with a crossbite of the UR incisors (#*7 and 8*) and a midline deviation to the right (*Figs. 5 and 6*). Tipping of adjacent teeth into the extraction site indicated the LL6 was probably lost early as a relatively isolated event (*Fig. 5*).[1,4,5,10,16] Overall, the morphologic pattern was consistent with molar incisor hypoplasia (*MIH*), a common developmental defect in enamel, with a mean prevalence of about 4-20% worldwide; MIH is thought to be associated with high fever at <3yr of age.[20,21,22] Incidence of enamel hypoplasia affecting individual teeth appears to be an endemic problem[22] of long duration because a similar prevalence to modern samples was recently detected in a medieval German population.[23] Defective enamel renders the affected molar highly susceptible to fracture and caries, and it is usually lost before the late transitional stage of dental development (*age 10-12yr*).[1,4,5,10,16,22] It follows that the probable cause of the asymmetric anterior crossbite for the present patient (*Figs. 1-5*) was the lack of a posterior centric stop after the left second deciduous molar was lost, which resulted in occlusal instability.[4,5] In the absence of posterior occlusion, affected children may posture the mandible anteriorly and laterally to achieve more comfortable mastication. Anterior posturing of the mandible may result in a crossbite, and an abnormal occlusal pattern that is manifest as an acquired malocclusion.[1,4,5,12,13]

Maxillary lateral incisors have the second highest incidence of congenital absence in the entire dentition, and they frequently present challenging orthodontic problems. For the current patient, the maxillary midline shifted to the right as space was lost due to a congenitally missing UR2 (#*7*), but it was still coincident with the mandibular midline, because the latter had also shifted to the right. The lower midline deviation was probably due to occlusal instability,[4,5] as previously discussed. Furthermore, TMJ imaging revealed a longer condylar process on the left side (*Figs. 5 and 6*) which is consistent with abnormal mandibular posturing to the right, relative of the facial midline (*Figs. 1 and 7*).

Bimaxillary protrusion was documented in the cephalometric analysis by the increased SNA and SNB angles (*Table 1*). However, lip prominence was only manifest facially as a protrusive mandible (*Fig. 1*), which was probably attributable to the anterior posturing of the mandible into an anterior crossbite. It appears that both chief complaints, irregular teeth and mandibular protrusion, were manifestations of the early loss of the LL6, due to MIH. Thus, the hypothesis for the etiology of the current malocclusion was an aberration in normal development, early loss of a lower first molar, that resulted in an acquired malocclusion. It follows that the treatment plan focused on reversing the etiology, by conservatively correcting the left posterior occlusion and anterior crossbite. Previous experience with MIH-acquired malocclusions in adults revealed that defining the etiology was an important aspect for the diagnosis, because conservative correction of the occlusion tends to recover the normal facial pattern.[1,4,5,10]

Another important aspect for the treatment plan was management of edentulous spaces due to four missing teeth: #7, 12, 15 and 19. Since there is only one molar remaining in the UL quadrant, space closure of the #19 space was the best option, but the roots of the lower left molar had a conical shape with little interradicular space. This root configuration fails to achieve the maximal anchorage[24] that was needed to retract the lower arch. Unfortunately the patient declined the use of TADs so Class III elastics and a root-mesial moment were necessary to supplement the marginal anchorage value of the LL molar. Fig. 9 shows the consequence: excessive mesial root movement of the LL molar (#*18*), resulting from prolonged use of an uprighting moment to achieve maximum retraction.

The missing UL4 space could not be closed because there is only one maxillary molar in the quadrant. However, the atrophic #12 extraction space with a ridge width <4-mm required mesial translation to create a #13 implant site, because the patient declined bone augmentation surgery. So implant placement was indicated with a simultaneous vestibular incision subperiosteal tunnel access (*VISTA*) approach for soft tissue augmentation. This specialized approach required an interdisciplinary

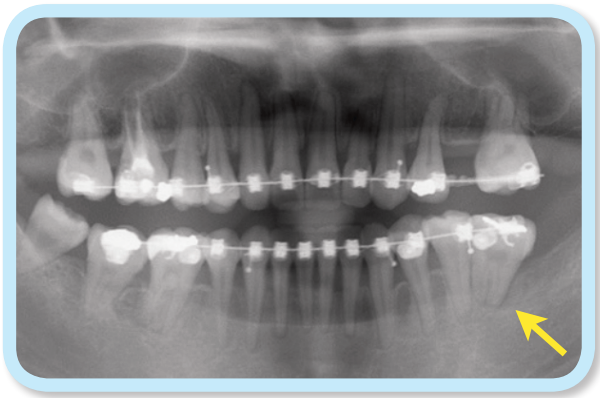


*Fig. 9:*
*During active orthodontic treatment all lower spaces are closed. There was a strain on the anchorage provided by the lower left first molar, as evidenced by mesial tipping to contact the roots of the adjacent second premolar. The implant site on the UL (area #13) was generated by mesial translation of #12. The alveolar bone height in the anterior region is stable compared to the pretreatment radiograph (Fig. 5). Anchorage was strained for the LL molar during space closure (yellow arrow). See text for details.*

team skilled in orthodontics, periodontics, and implant-supported prosthetics.

**Overview**: The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) for this challenging acquired malocclusion was 27 points, as detailed in the subsequent Worksheet 1. With a carefully sequenced interdisciplinary approach, the severe mutilated malocclusion was corrected to an excellent outcome as evidenced by a Cast-Radiograph Evaluation (*CRE*) of 22 points (*Worksheet 2*). The step-by-step approach to treatment planning and sequencing of interdisciplinary care is illustrated in Figs. 8-25. The final result is shown in Figs. 26-28, and radiographically documented in Fig. 29. Superimposed start and finish cephalometric tracings (*Fig. 30*) show the dentofacial correction, that is detailed in Table 1. Implant site development is illustrated in Fig. 31, and the VISTA soft tissue procedure is shown in Figs. 32 and 33. The long-term stability of the interdisciplinary treatment is documented in Fig. 34.

## Treatment Objectives

1. **Periodontal Maintenance**: oral hygiene instruction, thorough periodontal evaluation, and treatment (*as needed*) prior to placing orthodontic appliances; regular periodontal maintenance during and after interdisciplinary treatment.
2. **Minimally Invasive Approach**: full fixed orthodontics therapy for preprosthetic alignment and retraction of both arches; avoid TADs and bone augmentation surgery.
3. **Anterior Crossbite and Mandibular (*Md*) Midline Deviation**: anterior bite turbos, resilient archwires and intermaxillary elastics to align the arches; correct the intermaxillary relationship and maintain the vertical dimension of occlusion (*VDO*).
4. **Protrusive Lips**: extract the endodontically treated lower second premolar (#*29*) and retract both arches to reduce lip protrusion.
5. **Peg Lateral Incisor**: open space with a coil spring and align #10 for restoration with composite resin (*Fig. 10*).

*Fig. 10:*
*The upper photograph shows the maxillary left peg lateral incisor at the start of the space opening process. The lower view illustrates the peg lateral restoration process. The space was opened, bracket was removed, the tooth was restored to standard dimensions, and then the bracket was rebonded in an ideal position (yellow arrow).*

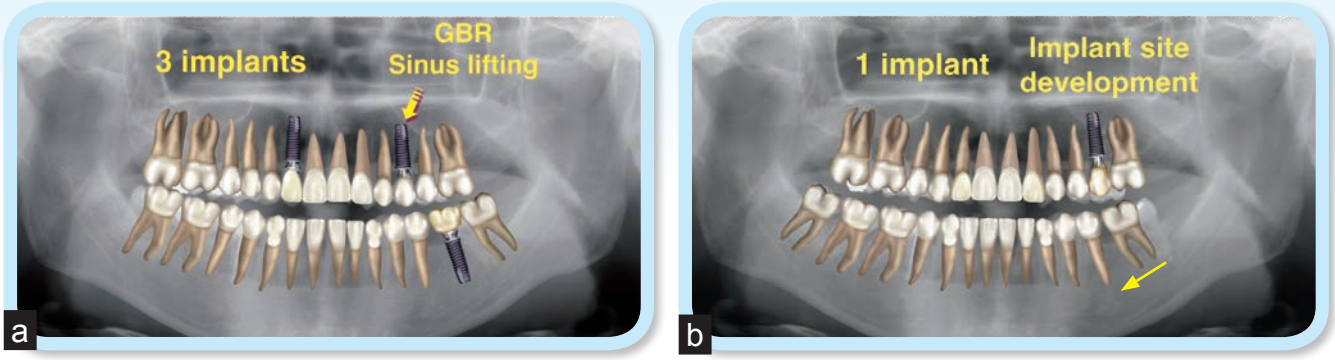



*Fig. 11:*

*a. Treatment Option 1 was opening space, and placing implants to replace the three missing teeth.*

*b. Treatment Option 2 was extract #29, close space in the lower arch, substitute the UR canine for the missing later incisor, generate an implant site in area of #13, and construct an implant-supported prosthesis.*

6. **Canine Substitution**: reshape and restore the UR canine and first premolar for orthodontic substitution to serve as the UR lateral incisor and canine.
7. **Implant Site Development**: Protract the UL4 to create an implant site mesial to the molar (*area #13*).
8. **Soft Tissue Augmentation**: simultaneous connective tissue graft, with a VISTA procedure, at the time of implant placement in the area of #13.
9. **Implant-Supported Prosthesis**: restore the implant with a porcelain fused to metal crown.
10. **Finishing**: orthodontic and soft tissue detailing to enhance facial and dental esthetics.

## Treatment Alternatives

The skeletal discrepancy and acquired nature of the malocclusion required at least some orthodontic correction and preprosthetic alignment to achieve an esthetic and stable result. Opening space to restore all the missing teeth (*Fig. 11a*) was rejected because it was an expensive option that failed to address bimaxillary protrusion, midline discrepancy and asymmetric posturing of the mandible. The best option was extraction of the LR5 (*#29*), and then closing space to retract the lower arch to reduce lip protrusion. This approach resulted in only one implant, which did not require bone augmentation, because it was placed in an orthodontically prepared site (*Fig. 11b*). The 3-4-mm right midline deviation of the maxillary arch (*Fig. 12*) was a necessary compromise for opening space to restore the peg lateral, without the use of TAD anchorage. Opening the bite with anterior turbos and intermaxillary elastics provided disclusion for crossbite correction and differential tooth movement to optimally correct dental alignment in the esthetic zone (*Fig. 13*). Implant site development in the upper left quadrant complied with the patient's request for minimally invasive treatment (*Fig. 14*). The limitations

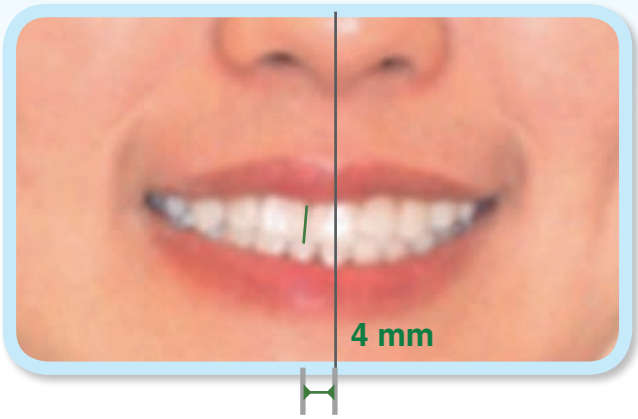



*Fig. 12:*
*The upper midline deviated to the right side about 4-mm when space was opened to restore the UL peg lateral (#10). This problem was avoidable with TAD anchorage that the patient declined. The midline discrepancy was decreased to 3-mm at the end of treatment.*

that the patient placed on treatment options, considerably increased treatment time and resulted in a compromised alignment in the esthetic zone, which produced a relatively high Pink and White dental esthetics score of 8.

## Treatment Progress

A 0.022-in slot Damon Q® passive self-ligating (*PSL*) fixed appliance (*Ormco, Glendora, California*) was selected and standard torque brackets were used in the anterior segments. All subsequent archwires, coil springs, elastomer chains and latex


*Fig. 13:*
*The UL illustration is the pretreatment view of the right buccal occlusion. The upper center view is the start of active treatment (0M) with anterior bite turbos and early light short elastics (ELSE). At five months (5M) the crossbite is corrected and the occlusion is settling into a near Class I. Twenty-two months into treatment (22M) the lower arch space is closed. At twenty-eight months (28M) treatment is in the finishing stage. The final result is shown at forty-two months (42M).*

elastics were supplied by the same manufacturer. The programmed archwire sequence for the upper arch was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS. The lower archwire sequence was 0.014-in CuNiTi, 0.018-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS.

Following extraction of the LR5 (#29), brackets were bonded on all maxillary teeth, except the UR7 (*Fig. 14*). Delaying the bonding of second molars avoids dislodging light wires from the distal tubes during mastication. When the initial maxillary archwire (*0.014" CuNiTi*) was inserted, an open coil spring was placed between the left central incisor and canine (*Figs. 10 and 13*) to increase the mesiodistal width to restore the peg lateral incisor with normal dimensions. Bite turbos were bonded on the lower right central and lateral incisors. The mandibular teeth were bonded two weeks later which was designated as zero months (*0M*) or start of active treatment (*Figs. 13 and 17*). As the anterior cross bite was corrected, early light short Class III elastics (*Quail 3/16" 2-oz*) were applied from the lower canines to upper first molars to retract the mandible and protract the maxilla (*Fig. 13*).

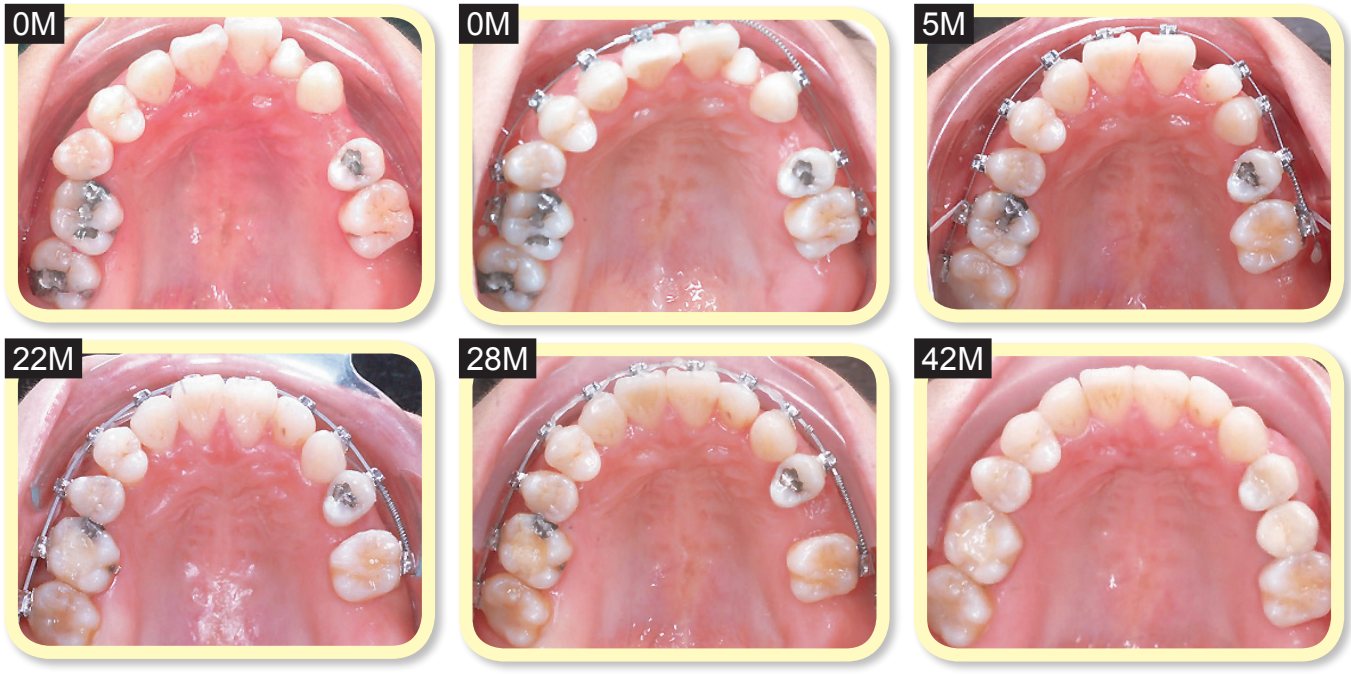



*Fig. 14:*
*As viewed from the upper left to the lower right, the correction of the maxillary arch is shown pretreatment, and at the start of active treatment (0M). Progress is illustrated at five months (5M), twenty-two months (22M), twenty-eight months (28M), and after all the the interdisciplinary procedures were completed (42M). See text for details.*


*Fig. 15:*
*Pretreatment (0M) black triangles are prominent in the lower anterior segment. At twenty-two months (22M) the black triangles were reduced by IPR and space closure. The result is further improved at the end of treatment (42M). Overall, IPR was performed six times in the upper anterior segment and three times in the lower anterior segment.*

In the 2nd month of treatment, a lingual button was bonded on the palatal surface of the upper left lateral incisor to assist its rotation. Elastomeric modules (*power chains*) were applied between the left lateral incisor and left second premolar.

In the 3rd month of treatment, the upper right second molar was bonded and the upper archwire was changed to 0.014x0.025-in CuNiTi to continue the arch development, as well as to complete the leveling and alignment. An open coil spring was applied between the upper left premolar and molar.


*Fig. 16:*
*An open coil spring was applied for opening space to restore the peg lateral from the beginning of treatment (0M). At nine months (9M) the peg lateral was restored and engaged on the archwire. See text for details.*

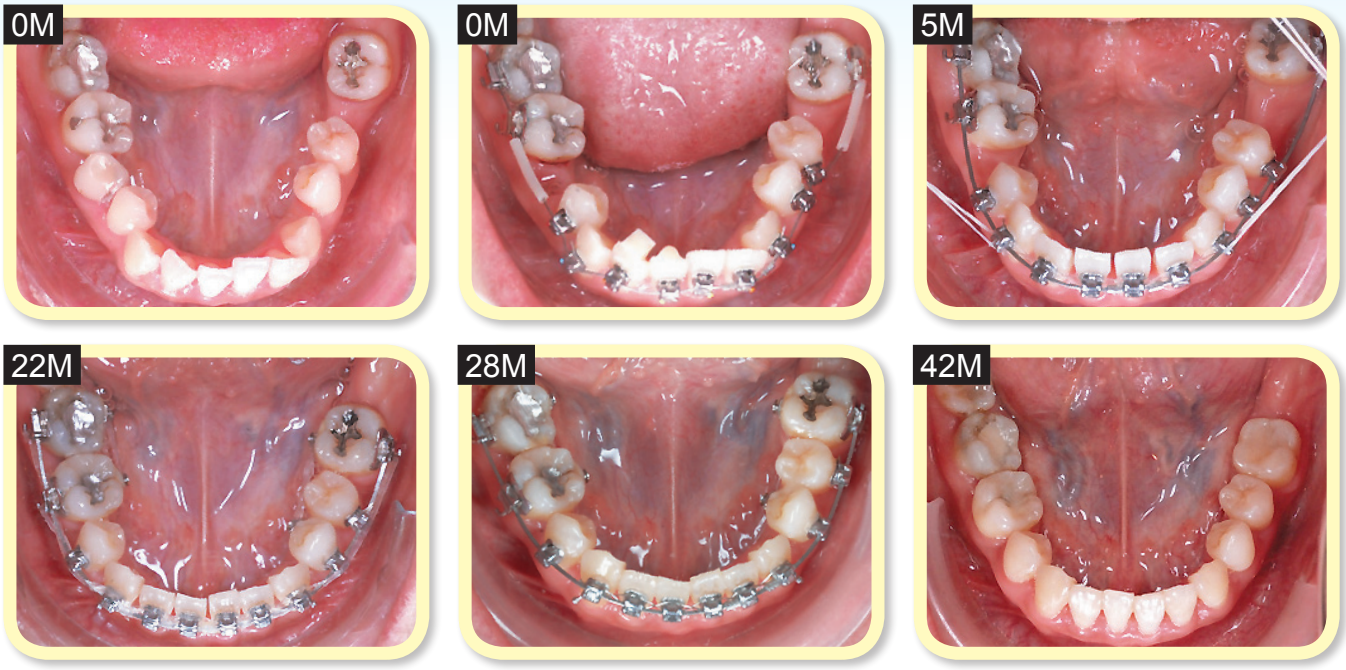
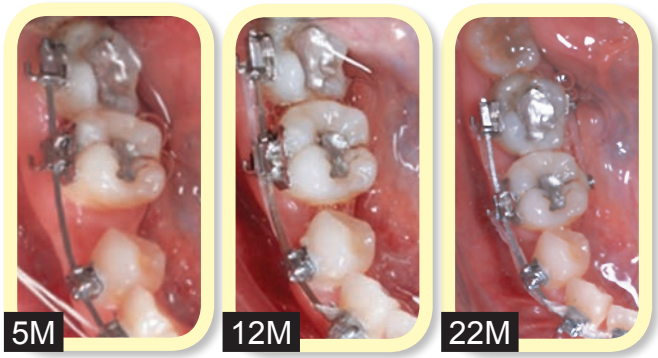



*Fig. 17:*
*From the upper left to the lower right views, the correction of the mandibular arch is shown pretreatment, and at the start of active mechanics (0M). Progress is illustrated at five months (5M), twenty-two months (22M), twenty-eight months (28M), and after treatment was completed (42M). See text for details.*

In the 4th month, the button on the upper left lateral incisor was replaced with a standard torque bracket, and a 0.014-in CuNiTi archwire was inserted in the PSL bracket. The lower arch archwire was changed to 0.018-in CuNiTi because the initial 0.014-in CuNiTi wire fractured.

In the 6th month, IPR (*inter-proximal reduction*) of enamel was performed on the lower incisors (*Fig. 17*). The upper and lower archwires were changed to 0.014x0.025-in CuNiTi and 0.017x0.025-in TMA, respectively. An open coil spring was applied between the upper left second premolar and first




0.014x0.025-in CuNiTi | 0.017x0.025-in TMA | 0.016x0.025-in SS

*Fig. 18:*
*Third order correction of the lower right molars and the archwire sequence is shown at five months (5M), twelve months (12M) and twenty-two months (22M). See text for details.*

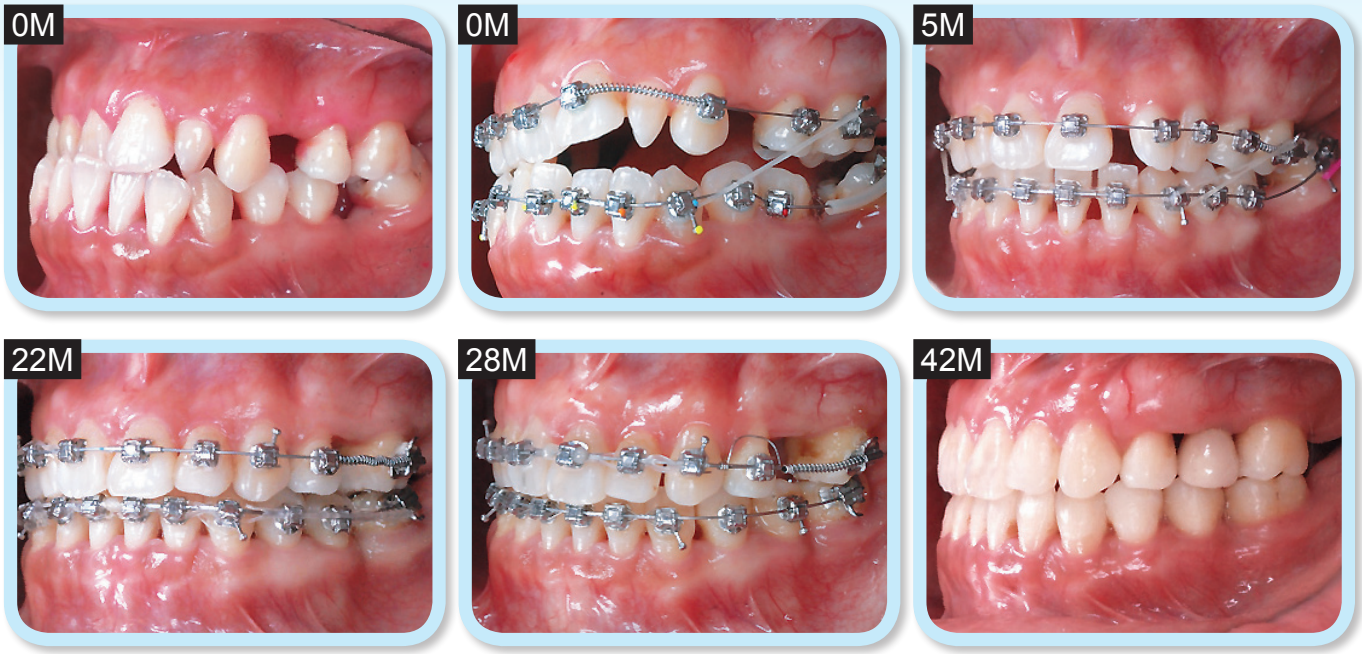



*Fig. 19:*
*Treatment progression on the left side is shown pretreatment (UL), and at the start of active treatment (0M). Progress is illustrated at five months (5M), twenty-two months (22M), twenty-eight (28M), and at the finish which is forty-two months (42M). See text for details.*

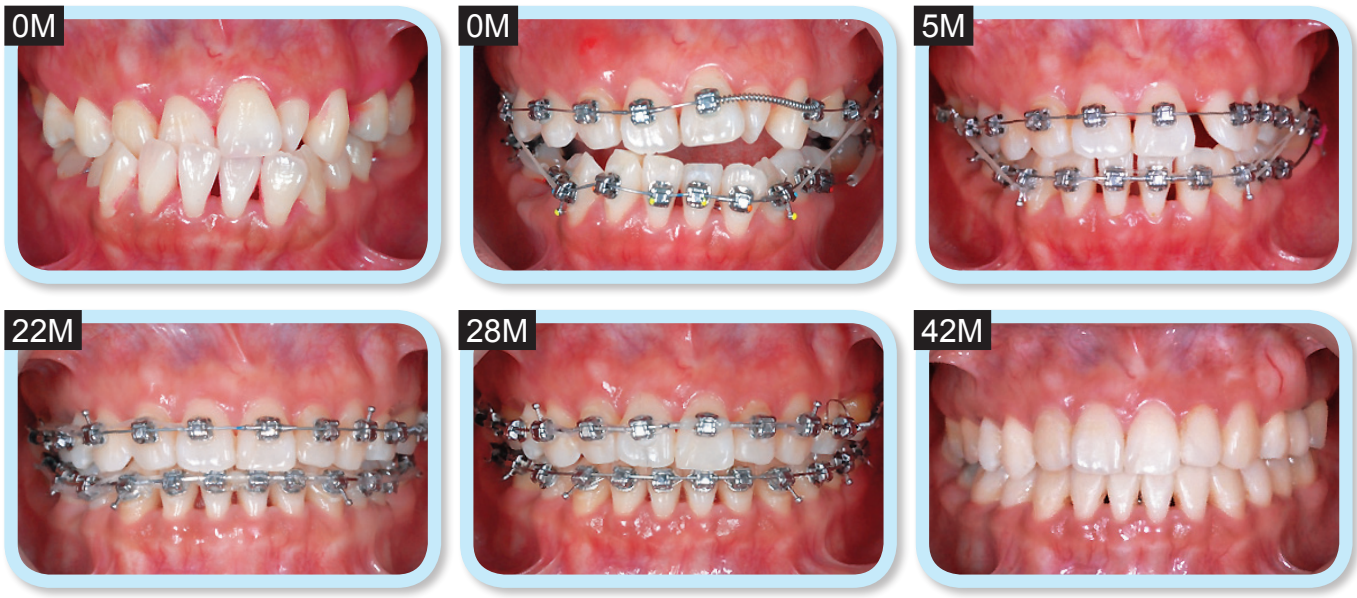



*Fig. 20:*
*Treatment progression in the frontal view is shown pretreatment (UL), and at the start of active treatment (0M). Progress is illustrated at five months (5M), twenty-two months (22M), twenty-eight (28M), and at the finish which is forty-two months (42M). See text for details.*

molar to open space for an implant. Bilateral Class III elastics (*Fox 1/4" 3.5-oz*), extended from the upper first molars to the lower canines, were used to resolve the sagittal discrepancy.

In the 8th month, the bracket on the upper left lateral incisor (*#10*) was removed and the tooth was restored to size and shape of the contralateral lateral with light cured resin. Following resin restoration, the bracket was rebonded on the ideal position (*Fig. 10*).

In the 10th month, the archwire was changed to 0.016x0.025-in SS in the upper arch and 0.017x0.025-in TMA in the lower arch. The upper and lower anterior segments (*3-3*) were ligated together with figure-eight ligature ties. The spaces in the lower arch were closed with elastomeric modules (*power chain*) to retract the anterior segment.

In the 12th month, the lower archwire was changed to 0.016x0.025-in SS.

In the 15th month, buttons were bonded on the lingual surfaces of the lower premolars and molars to equally distribute the space closing force on the buccal and lingual surfaces. The space between the UL5 (*#13*) and UL6 (*#14*) was progressively opened to develop an implant site. Full time cross elastics (*chipmunk 1/8", 3.5-oz*) were applied for 6 months to correct lingual inclination of the lower right second molar.

In the 22nd month, IPR was performed on the upper and lower incisors to diminish black triangles. The space generated was closed with an elastomer chain (*Figs. 15, 17, 19, 20*).

In the 24th month, lingual root torque was applied on the lower anterior segment to produce buccal tipping of the lower incisor crowns. L-configuration elastics (*Fox 1/4" 3.5-oz*) were extended from the upper canines to lower molars and passed beneath the hook on the lower canines.

In the 28th month, a torquing auxiliary was applied on the upper left second premolar to provide lingual root torque. Precise bracket repositioning was performed repeatedly throughout active treatment. L-configuration elastics (*Fox 1/4" 3.5-oz*) were also applied from the lower molars to upper canines for 13 months to maintain lower incisor crown torques (*Figs. 13, 17, 19, 20*).

In the 35th month, a pre-operative Cone-Beam Computed Tomography (*CBCT*) scan (*Fig. 21*) was taken to evaluate the alveolar bone volume in the implant site in the area of tooth #13, mesial to the first molar (*#14*). From the slice views, it was noted that sufficient bone volume was available for a 4x9-

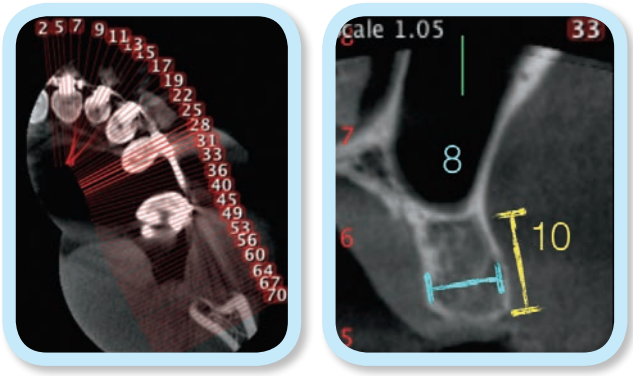



*Fig. 21:*
*A CBCT scan revealed that the edentulous ridge was 8-mm wide and 10-mm high, which was suitable for a 4x9-mm implant fixture. Furthermore, the osseous anatomy was adequate for a flapless implantation procedure.*

mm implant (*Fig. 21*). A surgical stent was designed for precise positioning of the implant in three dimensions. The implant fixture was positioned 3-mm below the future crown margin, with a distance of at least 1.5-mm from the adjacent teeth. The 2B-3D rule was followed: 2-mm of bone buccal to the implant, and the occlusal margin of the implant was 3-mm apical to the expected margin for the subsequent crown. This rule is useful for dental implant planning, placement and restoration (*Fig. 22*).

## *Implant placement procedures*

In the 36th month of treatment, the implant procedure is illustrated in Figs. 22 and 23. The orthodontically prepared site (*Fig. 23a*) was opened on the palatal aspect of the ridge (*Fig. 22*) with a trephine bur, that removed a 4-mm diameter plug of soft tissue to expose underlying bone (*Fig. 23b*). After the initial osteotomy with a lancer drill, a guide pin was inserted in the wound (*Fig. 23c*) and a periapical radiograph was exposed to check the parallelism and proximity of the osteotomy to adjacent teeth (*Fig. 23h*). The apical portion of the osteotomy was adjusted ~8° distally according the manufacturer's recommended surgical protocol. According to 2B3D rule (*2-mm of buccal bone and 3-mm apical to desired margin of the future crown*),[14,15] an 4x9-mm Astra OsseoSpeed™ (*Dentsply Implants, Mannheim, Germany*) implant fixture was installed (*Figs. 23d-f*). A flared healing abutment (*4.5-H4*) was screwed into the implant to form the peri-implant mucosal contour. A post-operative periapical radiograph was exposed to check the position and angulation of the implant (*Fig. 23i*).

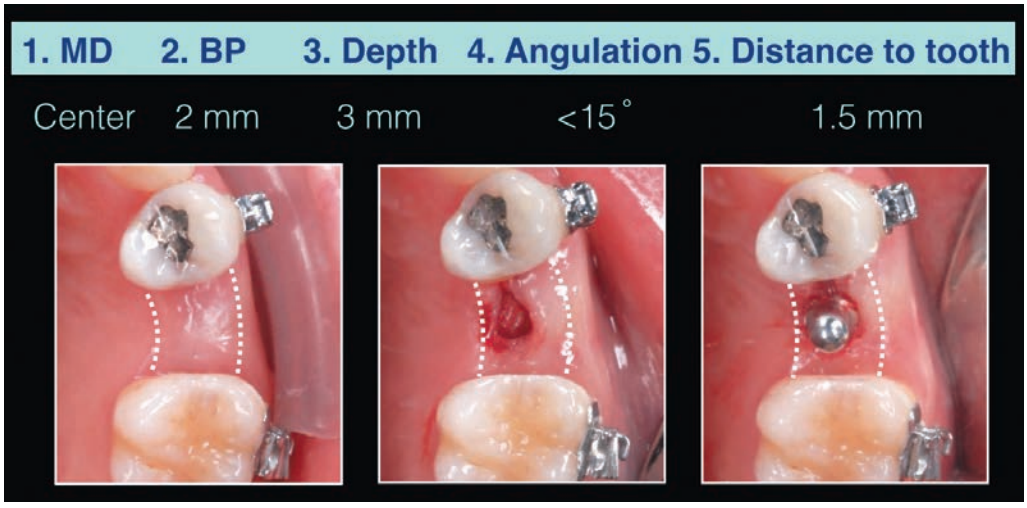



*Fig. 22:*
*The fixture position is determined by: 1. Mesiodistal (MD) dimension, 2. Buccal plate (BP) thickness, 3. Depth, 4. Angulation and 5 Distance to the adjacent tooth (teeth). The implant is placed in the center of the MD space, with 2-mm of buccal bone (plate), and 3-mm apical to the subsequent crown margin (2B3D rule). The fixture must be within 15° of an ideal inclination (<15°) and be at least 1.5-mm away from the nearest tooth. See text for details.*

## *Soft tissue grafting with Vestibular Incision Subperiosteal Tunnel Access technique*

The soft tissue augmentation with a connective tissue graft (*CTG*) is illustrated in Fig. 24. Immediately following the surgical implantation procedure (*Fig. 24a*), a CTG was performed with the VISTA technique (*Fig. 24b-i*). A 15-mm vertical incision was made through the periosteum mesial to the canine, and a subperiosteal tunnel was elevated with VISTA-2 elevator (*Dowell Dental Products, Cucamunga, California*) (*Fig. 24b*). This subperiosteal tunnel was extended interproximally under the papilla without making any additional incisions. A slight perforation occurred in the alveolar mucosa over the left canine eminence (*Figs. 24b-c*). The root surface of tooth #13, previously moved to the position of #12, was carefully prepared with a round diamond bur: overhanging composite resin was removed and a

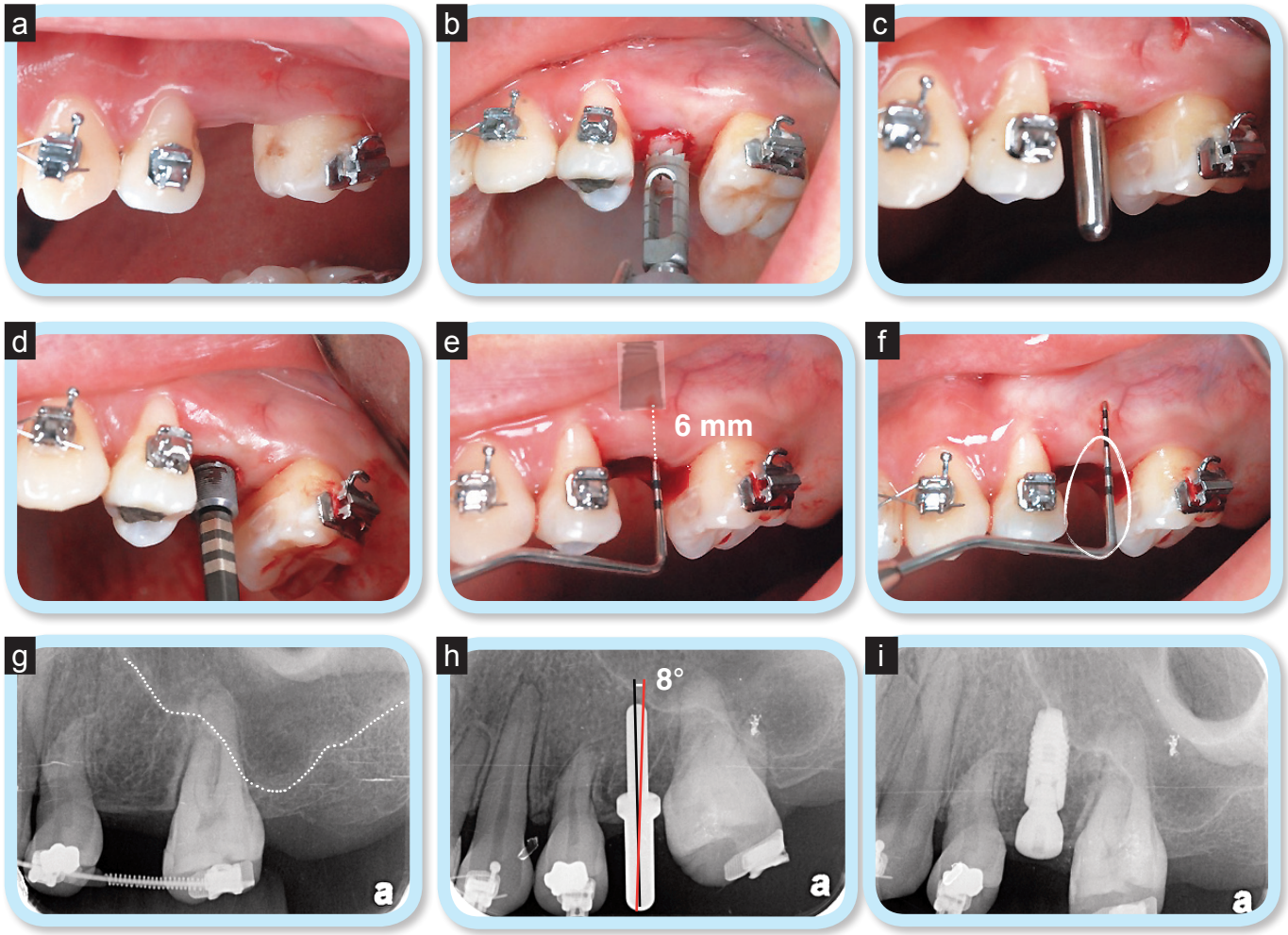



*Fig. 23:*
*The clinical procedures and measurements for implant placement: a. pre-operative view, b. soft tissue trephine, c. guide pin, d. implant insertion, e. implant depth measurement (6-mm to the fixture platform), f. width of attached gingiva, g. Mx sinus floor evaluation, h. axial inclination adjustment of 8°, and i. installed fixture. See text for details.*

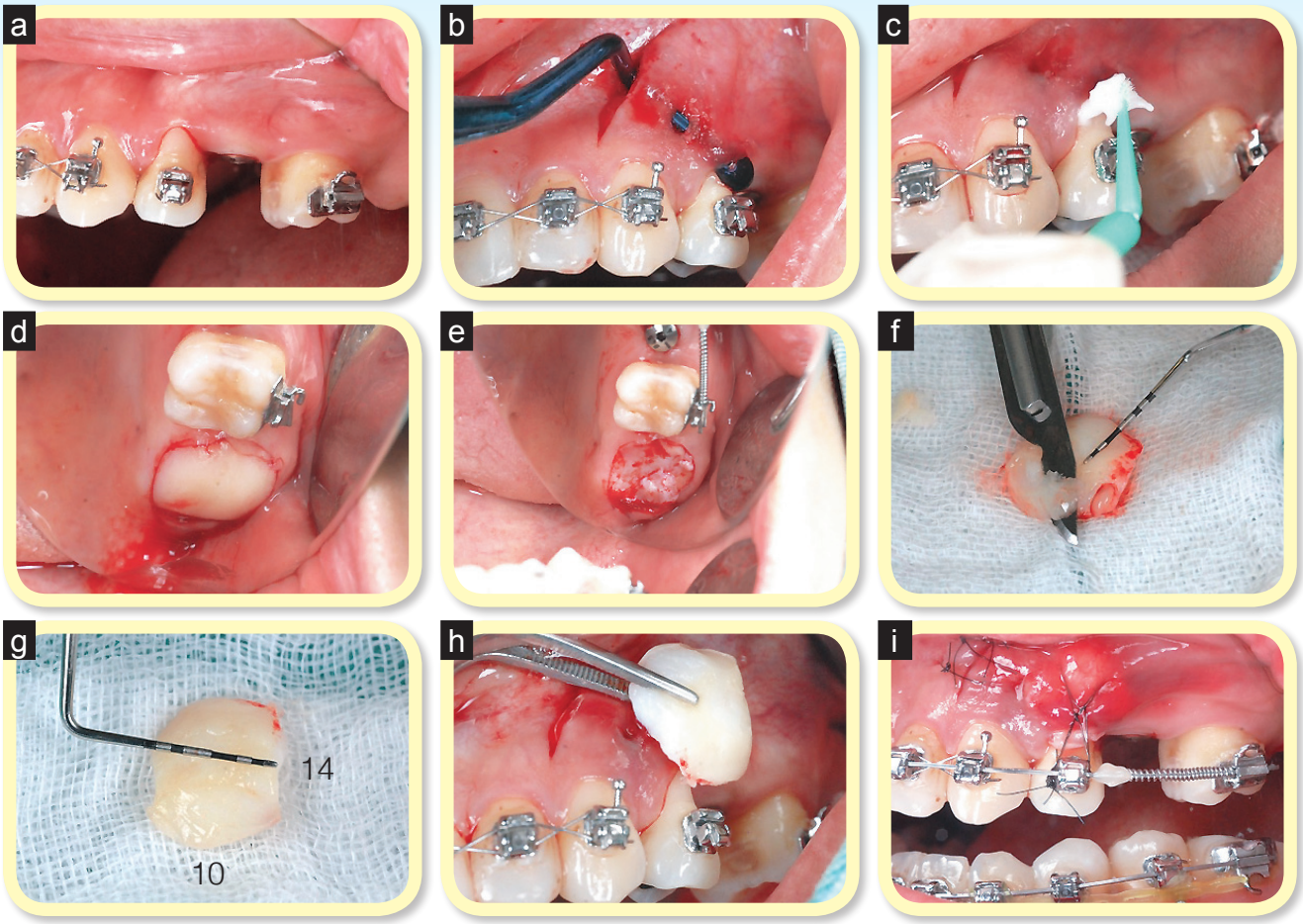



*Fig. 24:*
*Soft tissue grafting with the VISTA technique is illustrated with a series of photographs: a. pre-operative view, b. tunneling through the vertical incision, c. preparation of the root surface, d. soft tissue incision of donor site, e. donor site after the gingival specimen was removed, f. epithelium is removed from the connective tissue, g. prepared graft, h. fitting the graft the recipient site, and i. completed connective tissue grafting procedure. See text for details.*

slight concavity was formed in the cervical area to receive the soft tissue graft. The site was throughly prepared with curettage and de-contamination. Root conditioning was performed with ethylenediamine-tetraacetic acid (*EDTA*) gel for 30 seconds (*Fig. 24c*). A 14x10-mm soft tissue graft (*Fig. 24d*) was harvested from the upper right tuberosity with a No. 15c blade (*Fig. 24e*). The epithelium was carefully removed with a new sterile No. 15c blade to prevent epithelium entrapment under the connective tissue (*Fig. 24f*). The CTG (*Fig. 24h*) was inserted through the tunnel and positioned over the cervical root area of #13. Then the graft and flap margin were advanced coronally and stabilized in the desired position (*Fig. 24i*). The vertical incision was closed and sutured. A coronally advanced suture (*4-0 nylon*) was secured to the facial aspect of #13 with bracket and reinforced with light cured composite resin, to prevent apical relapse of the gingival margin during healing. The sutures around the vertical incision were removed 1

week later, and the coronally anchored sutures were removed at the 3-week postoperative evaluation.

After 41 months of active treatment, all appliances were removed. Upper and lower clear overlay retainers were delivered for both arches.

## *Implant Prosthesis Fabrication*

Six months after the implant placement (*Fig. 25a*), the healing abutment was removed (*Fig. 25b*), and a direct abutment (*5x4-mm, 3.5/4.0*) was selected for prosthesis fabrication (*Fig. 25c*). Before taking the impression, the abutment was torqued twice to 25-35 N-cm with a torque wrench (*25e*). The screw access hole for the abutment was then sealed with a small cotton pledget and temporary cement. For the abutment level impression, the surface of the abutment was aligned with the raised knob on the Impression Pick-up and it was firmly snapped it into

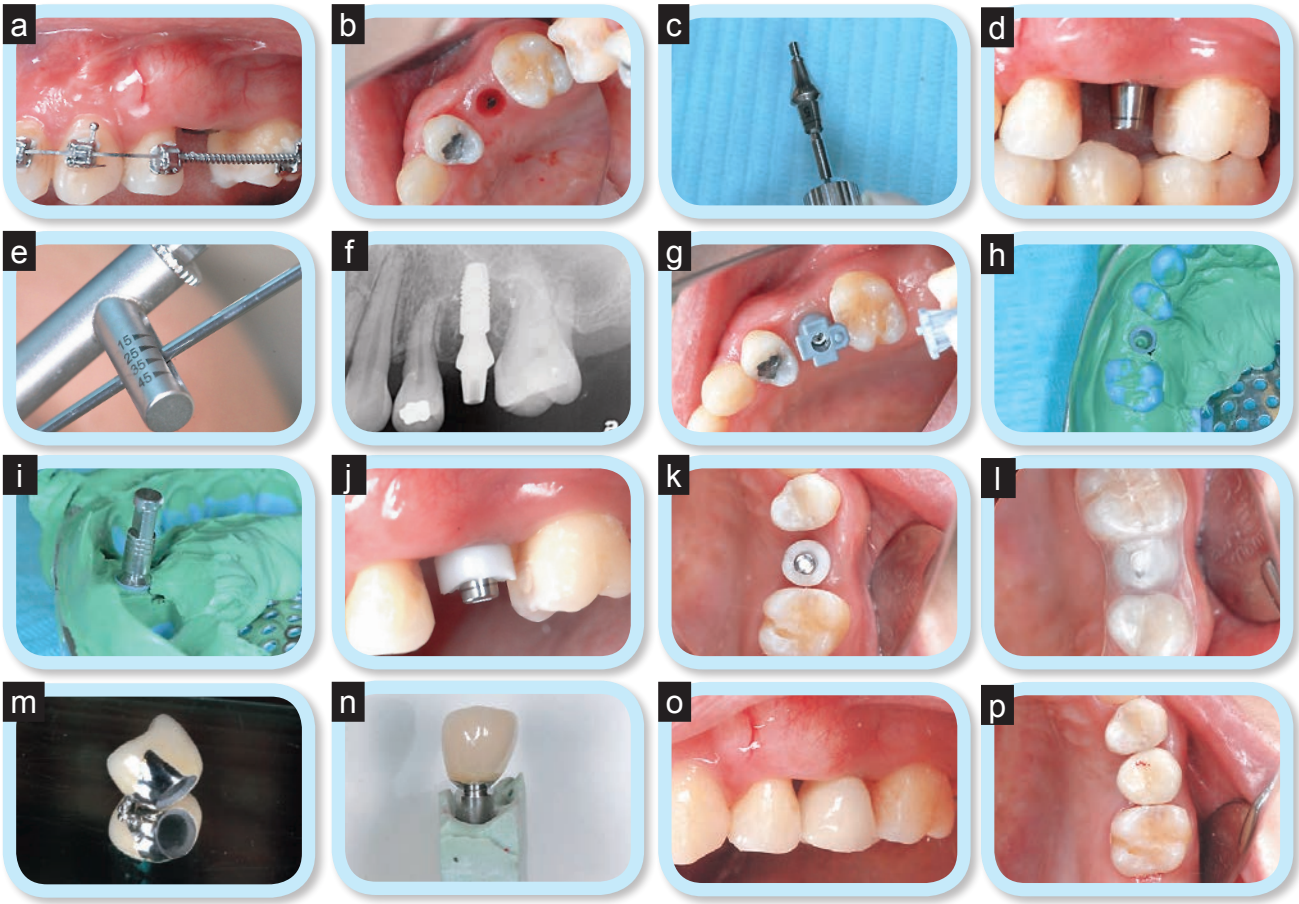



*Fig. 25:*
*The implant prosthesis fabrication is illustrated as follows: a. buccal view of the site for the implant-supported crown, b. occlusal view of the site in area of tooth #13, c. abutment ready to insert, d. abutment seated on the implant, e. torque wrench, f. implant with abutment after being torqued to place, g. impression pick-up seated on the abutment, h. impression with the embedded pick-up, i. analogue seated in the pick-up, j. lateral view of the Tony cap fitted in the implant to form and control soft tissue, k. occlusal view of the Tony cap, l. overlay retainer seated over the Tony cap, m. fabricated porcelain fused to metal crown lying on a reflecting surface, n. crown fitted on the abutment, o. buccal view of the final implant-supported crown, and p. occlusal view of the crown restoring tooth #13.*

| CEPHALOMETRIC | | | |
|---|---|---|---|
| SKELETAL ANALYSIS | | | |
| | PRE-Tx | POST-Tx | DIFF. |
| *SNA° (82°)* | 86˚ | 86˚ | 0˚ |
| *SNB° (80°)* | 85˚ | 85˚ | 0˚ |
| *ANB° (2°)* | 1˚ | 1˚ | 0˚ |
| *SN-MP° (32°)* | 38˚ | 35˚ | 3˚ |
| *FMA° (25°)* | 31˚ | 28˚ | 3˚ |
| DENTAL ANALYSIS | | | |
| U1 TO NA mm *(4 mm)* | 6 mm | 3 mm | 3mm |
| *U1 TO SN° (104°)* | 105.5˚ | 108˚ | 2.5˚ |
| L1 TO NB mm *(4 mm)* | 9 mm | 2 mm | 7mm |
| *L1 TO MP° (90°)* | 83˚ | 68˚ | 15˚ |
| FACIAL ANALYSIS | | | |
| E-LINE UL *(-1 mm)* | -2 mm | -2 mm | 0 mm |
| E-LINE LL *(0 mm)* | 3 mm | -1 mm | 4 mm |

■ Table 1: Pre-Tx and Post-Tx Cephalometric Analysis Summary

place (*Fig. 25g*). A closed tray impression technique was used. Polyvinyl siloxane material was injected to make the impression (*Fig. 25h*). The impression was checked and the analogue was inserted (*Fig. 25i*).

The height of the abutments must not infringe on the 2-mm of occlusal clearance required for the fabrication of a porcelain fused to metal crown (*Fig. 25d*). After checking the occlusal clearance, the abutment was cemented with Tony caps (*Alliance Global Technology, Kaohsiung City, Taiwan*) to prevent soft tissue overgrowth (*Fig. 25j-k*). A clear retainer was also delivered to maintain the position of adjacent teeth (*Fig. 25l*). The permanent crown was constructed (*Fig. 25m-n*) and fitted to the abutment intraorally (*Fig. 25o-p*). Gingival margin integrity was verified with a dental explorer, and the appropriate tightness of the contact area was confirmed with dental floss. After radiographic verification of the abutment fit, the permanent crown was luted to place with permanent cement.

## Treatment Results

The patient was treated to the desired result as documented in Figs. 26-28. The cephalometric and panoramic radiographs before and after treatment are shown in Figs. 5 and 29, respectively. Before and after treatment cephalometric tracings were superimposed in Fig. 30. The summary of cephalometric measurements is provided in Table 1.

The protruded lower lip was retracted 4-mm by closing the bilateral extraction spaces. The significantly decreased L1-MP angle indicates that the lower incisors were tipped lingually. For Tweed's diagnostic triangle, a 90 degree of L1-MP angle was the key to achieving optimum stability.[25] If the L1-MP angle for the current patient were treated to 90 degrees, the chin would be even more protrusive. The Tweed standard could only be achieved with orthognathic surgery. Conservative treatment required lingually tipped lower incisors (*Fig. 30*).

The American Board of Orthodontics (*ABO*) Cast-Radiograph Evaluation (*CRE*) was 22 points (*Worksheet 2*), as documented later in this report. The major discrepancy was 5 points scored for occlusal relationships, and 4 points were scored for buccolingual inclination. The latter primarily involved the lingually inclined lower right molars. All extraction spaces were closed.

The Pink & White dental esthetic score was 8

*Fig. 26:*
*Post-treatment facial photographs show acceptable symmetry, markedly improved (straight) profile, and pleasing smile line.*

*Fig. 27:*
*Post-treatment intra-oral photographs reveal an asymmetric upper arch with a 3-mm midline deviation. The mandibular midline was within normal limits after the crossbite was corrected. Upper and lower occlusal archforms are near ideal.*

*Fig. 28:*
*Post-treatment white stone models (casts) show the final alignment that is scored for a CRE of 22 points. See Worksheet 2 for details.*

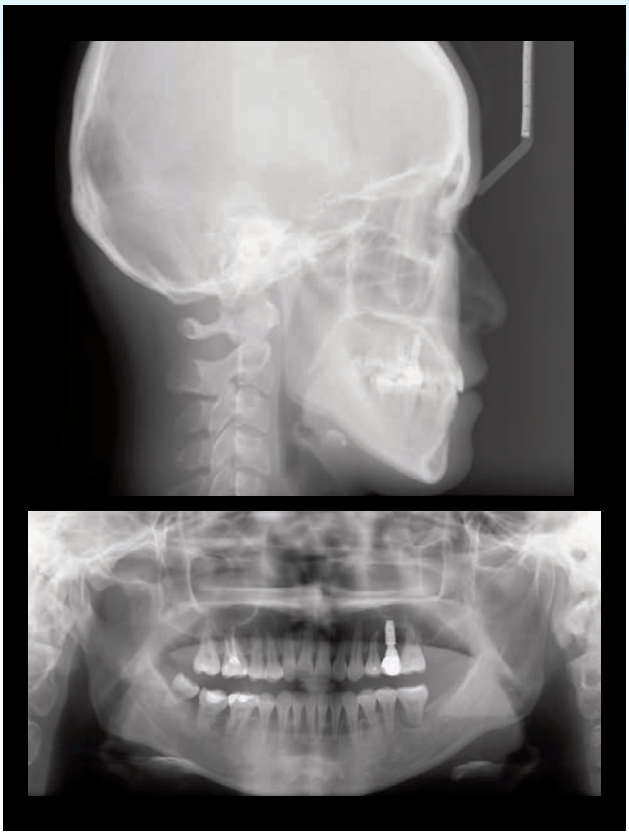


*Fig. 29:*
*Post-treatment cephalometric and panoramic radiographs document the final outcomes for the interdisciplinary treatment.*

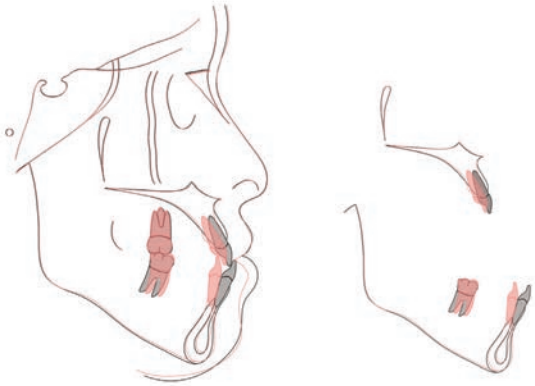


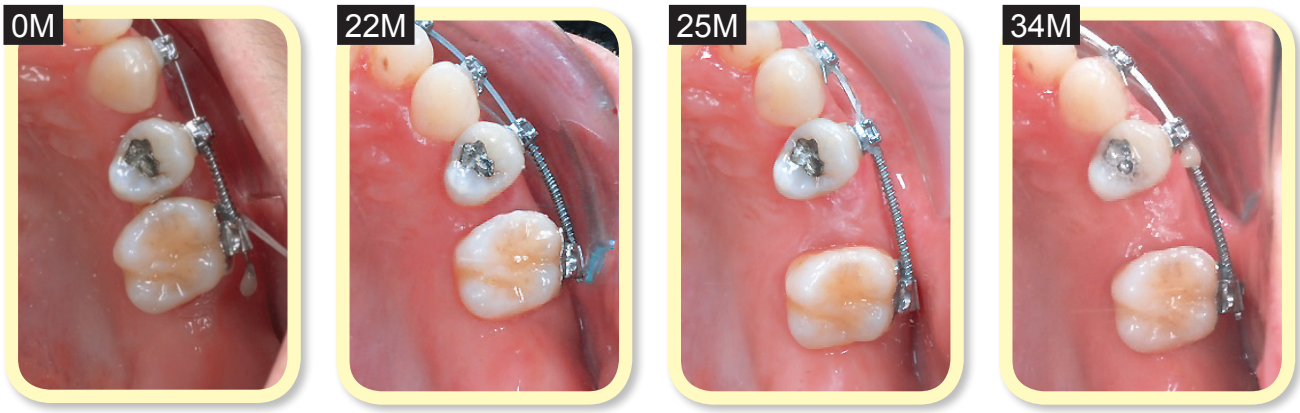
*Fig. 30:*
*Cephalometric tracings document the dental and skeletal changes during treatment. The pretreatment (blue) and post-treatment (red) tracings are superimposed on the anterior cranial base (left), as well as on the stable skeletal landmarks of the maxilla (upper right), and mandible (lower right).*

points (*Worksheet 3*), as documented on the form appearing later in this report. The major discrepancy was the white esthetic score (*6 points*) because of restorative problems in managing the upper left peg lateral and congenitally missing right lateral incisor. The major compromise was the positioning and spacing of teeth in the maxillary anterior segment which resulted a midline deviation of about 3-mm to the right. Esthetic composite resin restorations were performed for the left lateral incisor and the right canine-premolar substitution, but it was still very challenging to compensate for the compromised alignment. The esthetic zone problems were preventable with TAD anchorage, but the patient preferred the esthetic compromises rather than agree to the use miniscrew anchorage.

The UL implant-supported prosthesis was a near ideal restorative procedure. The implant was correctly positioned and angulated, but the mesial and distal papillae were blunted. There was no impact on esthetics while smiling (*Figs. 26 and 27*), but open interproximal spaces tend to trap food so they can be a hygiene problem.

Overall, post-treatment radiographs (*Fig. 29*) document near ideal facial form, well aligned dentition, ideally positioned implant-supported prosthesis, and stable alveolar bone height. Both dental arches were retracted to correct lip protrusion (*Fig. 30*). Extraction spaces were closed and the maxillary arch was expanded with a minimally invasive approach to correct the crossbite (*Figs. 27 and 28*). Overall, the treatment outcomes were an excellent conservative result, considering the restriction on the use of orthognathic surgery and TADs. The patient was quite satisfied with the result.

Figs. 13, 14, 16, and 17-20 are intraoral photographs documenting the orthodontic treatment sequence. Despite the asymmetric length of the mandibular condyles, due to the acquired malocclusion (*Fig. 6*), unlocking the occlusion with anterior bite




■ *Fig. 31:*
*Sequential occlusal views of implant site development are show from the start of space opening (0M) to thirty-four months (34M). Conservative orthodontic implant site development in the area of #13 required 29 months. This relatively slow rate of tooth movement was associated with increased bone height and width of the ridge, and also resulted in increased attached gingiva. See text for details.*

turbos permitted crossbite correction with routine archwire alignment of the upper arch. Restoring a normal pattern of occlusal function resulted in improved mandibular symmetry (*Fig. 26*). No significant tempo-mandibular disorder was noted before, during or after treatment. These data indicate that the TMJ has a remarkable ability to adapt to functional occlusion.

Orthodontic implant site development is longitudinally documented in Fig. 31. Fig. 32 illustrates the VISTA surgical sequence that is recommended for orthodontically generated sites. Fig. 33 is a VISTA alternative for atrophic implant sites that are not prepared orthodontically.

Upper and lower clear overlay retainers were delivered. The patient was instructed to wear them full time for the first 6 months and then nights only. Home care and retainer maintenance instructions were also provided. The patient returned for one-year follow-up evaluation. All of the treatment results were stable, and the mandibular asymmetry continued to improve (*Fig. 34*).

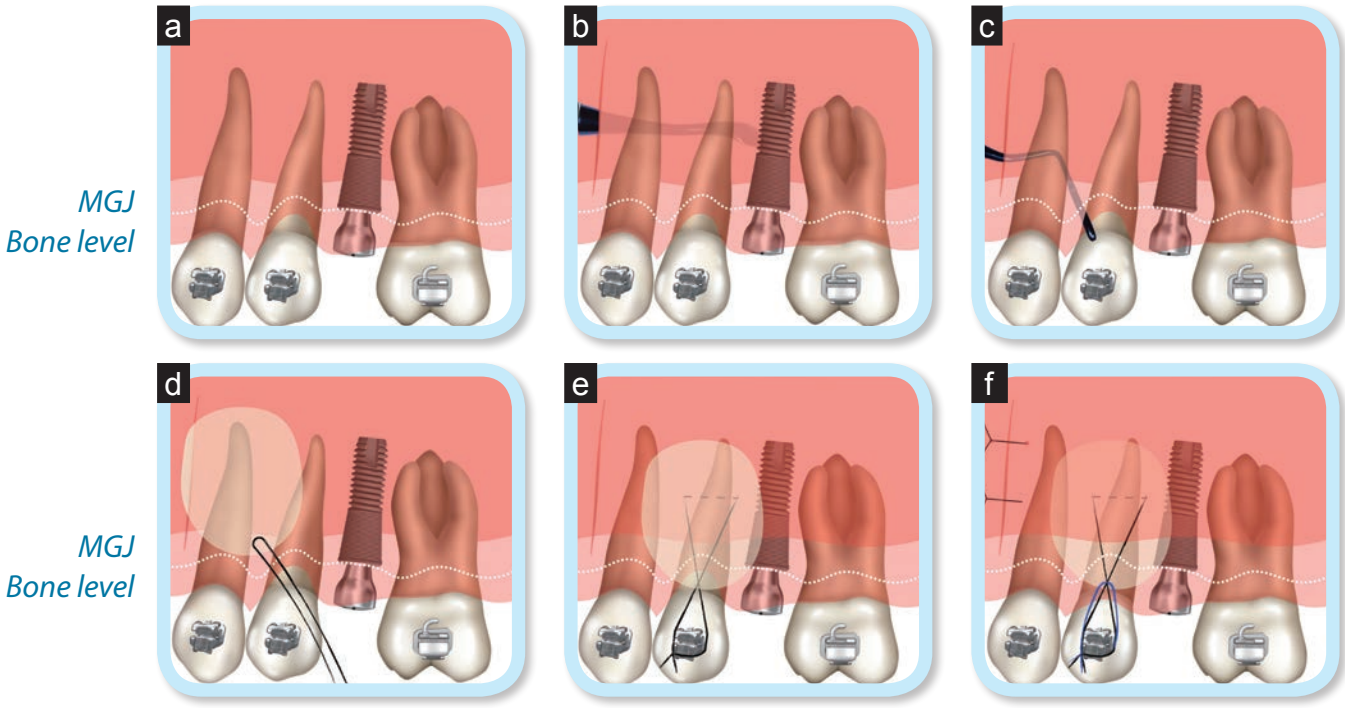



*Fig. 32: CTG in an Orthodontically Generated Implant Site.*
*Assuming adequate hard and soft tissue was produced in the implant site, the connective tissue grafting (CTG) procedure via VISTA access is shown for augmenting the periodontium of a tooth adjacent to the implant: a. After implant site development, 2-mm of gingival recession was noted on tooth #13, that was moved to the #12 position, b. A 5-mm vertical incision and subperiosteal tunnel was created with Vista 1 periosteal elevator, c. The tunnel was coronally advanced to the gingival margin of tooth #13 with a Vista 3 periosteal elevator, d. A lasso silk suture was used to guild the tuberosity CTG through the vertical incision and into the subperiosteal tunnel, e. A horizontal mattress suture was secured to the crown of the tooth to immobilize the tuberosity graft, f. The buccal flap of mucosa was coronally advanced 2-mm occlusal to the cementoenamel junction (CEJ) level, and the modified horizontal mattress suture was wrapped and tied around the bracket. See text for details.*

The Discrepancy Index (*DI*) scoring method is explained in Worksheet 1. The Cast Radiograph Evaluation (*CRE*) is detailed in Worksheet 2. Pink and White dental esthetic score was 8 because of the compromised management of the peg lateral incisor (*Worksheet 3*). Implant-Abutment Transition & Position Analysis was an ideal zero (*Worksheet 4*). All of the outcomes worksheets are at the end of this report.

Overall, the patient was very pleased with the interdisciplinary treatment delivered. The pattern of skeletal and dental compensation necessary to conservatively manage this severe malocclusion with a DI=27 is revealed in the cephalometrics. The balanced maxillary protrusion (*ANB 1°*) is less noticeable due to an increased lower facial height associated with an increased mandibular plane angle (*FMA 28°*) and lingually inclined lower incisors (*L1 to MP 83°*).

## Discussion

The goal for restoring missing teeth is to collectively

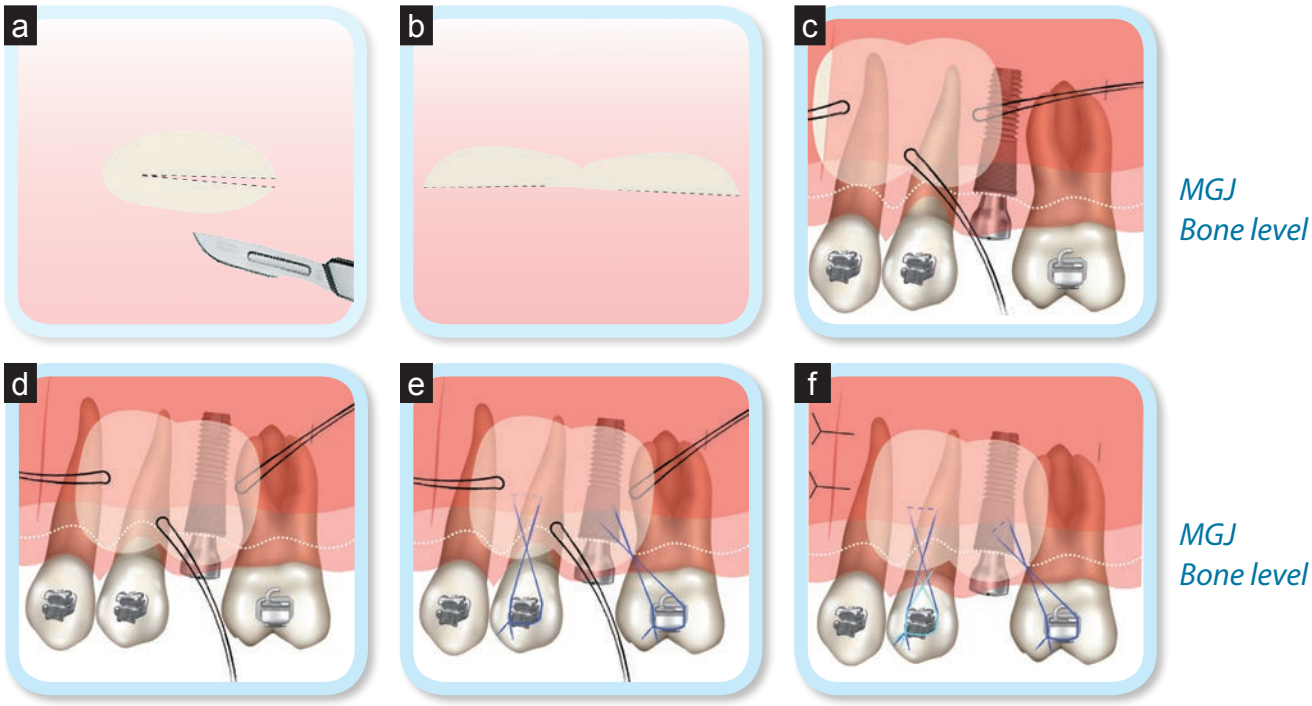



*Fig. 33: CTG for an Implant and an Adjacent Tooth.*
*If the implant site development was not performed and buccal soft tissue is inadequate over both tooth #13 and implant fixture, the VISTA technique should be modified: a. The thick tuberosity graft is partially sliced, b. The graft is unfolded to increase its length (not to scale), c. The unfolded graft is inserted through the vertical incision into the subperiosteal tunnel with guiding lasso sutures, d. The CTG is positioned on the buccal surface of the implant and the adjacent tooth with gingival recession (#13), e. The two halves of the unfolded tuberosity graft are immobilized with separate modified horizontal mattress sutures secured with the brackets on the teeth adjacent to the implant, f. The gingival margin of tooth #13 is coronally advanced to 2-mm occlusal to the CEJ with another modified horizontal mattress suture secured to the bracket. See text for details.*

achieve normal function, comfort, esthetics, speech, and longterm health. Congenitally missing permanent maxillary lateral incisors are a substantial challenge for achieving an esthetic outcome. The usual treatment options are opening the space and restoring the missing tooth with an implant-supported prosthesis, or moving the entire buccal segment mesially to substitute the adjacent canine for the missing lateral. Patients and clinicians often prefer the space closure option because they deem it a more conservative and desirable treatment plan compared to implants and prostheses.[26-28] The specific criteria for canine substitution were reviewed by Kokich and Kinser.[29] In addition to periodontal health, there are a number of important considerations when considering dental substitution: facial profile, type of malocclusion, space conditions, morphology and shades of the crowns, length of roots and gingival contours.[29,30]

*Fig. 34: One year follow-up records.*
*The stability of the dentofacial outcomes is documented. Despite the lingually inclined lower incisors (decreased L1-MP angle), the occlusal correction is stable. Note that the mandibular deviation continued to improve with a normal pattern of masticatory function.*

For the present patient (*Figs. 1-3 and 5*), the convex facial profile and space conditions favored the canine substitution. Because #12 was extracted years previously, the edentulous alveolar ridge was atrophic. The literature documents that alveolar ridge atrophy rapidly progresses for 6 months after the extraction, resulting in a loss of horizontal ridge width to a mean of 3.8-mm, coupled with a mean vertical reduction in ridge height of 1.24-mm.[31] Ridge preservation following extraction can maintain the volume and height of the edentulous ridges.[32,33] However, patients rarely benefit from this procedure because they deem it as expensive and unnecessary. Thus, most patients require bone augmentation with guided bone regeneration before placing an implant.

## *Implant site development*

Instead of guided bone regeneration, an implant site development was performed by translating tooth #13 through the edentulous site where #12 was extracted. As expected there was an increase in attached gingiva, bone height and ridge width at 34 months into active treatment (*Fig. 31*).

Theoretically, implant site development[34] can be accomplished in any portion of the alveolar ridge

where an implant is to be placed.[35] The regenerated bone width is directly related to the buccal-lingual dimension of the tooth moved through the defect.[34] The bone created by moving a tooth through an edentulous site in the maxilla is relatively stable and the post-treatment reduction of the alveolar width is relatively small. Novckova et al.[36] noted that the loss of bone mass, in sites orthodontically prepared for implants to restore missing lateral incisors, was less than 1% up to 4 years after treatment. The reduction of the alveolar ridge width was less than 2% up to 5 years after treatment.[36]

The previous studies were performed for edentulous areas in the maxilla, predominately the lateral incisor area. A subsequent study evaluated ten orthodontically generated edentulous areas in the premolar areas of the maxilla and mandible.[37] Only three of the ten orthodontically generated sites received an implant; two were in the maxilla and one was in the mandible. Following orthodontic development of an edentulous ridge, a decreased width was noted for a newly established edentulous area, but the width increased for the ridge into which the tooth was moved.[37] These data are difficult to interpret because of the variability in maxillary and mandibular premolars, and how the edentulous areas were subsequently treated: fixed bridge, space closure, or implant. However, a consistent finding in the study was that teeth moved into an alveolar defect showed lateral root resorption on the pressure side at the level of the atrophic bone crest. The area of lateral root resorption tended to repair at 1-year follow-up.[37]

## *Root coverage procedure*

Gingival recession defects[38] in conjunction with orthodontic tooth movement are a concern when a tooth is moved outside of the process of alveolar bone. Furthermore, there is a relationship between the development of soft tissue recession, thin gingival biotype, pre-treatment presence of recession, and/or gingival inflammation.[38]

Following implantation, a soft tissue graft with the VISTA technique enhanced the long term esthetic results for the implant prostheses and the adjacent teeth. There are several systematic reviews which have identified advantages for autogenous subepthelial CTGs relative to root coverage and increased width of keratinized tissue.[38,39] In these reviews, the CTG was often superior to guided tissue regeneration and allografts for at least some aspects gingival recession treatment. Additional studies examining longterm results of the CTG appear to further support long-term efficacy for maintaining root coverage.[40]

Root coverage procedures require donor tissue harvesting, tunnel preparation in the recipient site and a coronally advanced flap.[41] The conventional tunnel preparation primarily uses an intrasulcular approach to create either a sub- or supraperiosteal space to extend beyond the mucogingival junction, allowing graft tissue to be inserted under the gingival collar. Intrasulcular tunneling is technically challenging because of the need to obtain access through a small sulcular access point. The increased

risk of traumatizing and perforating the mucosa may result in unfavorable healing outcomes. As a consequence of these limitations, the vestibular incision subperiosteal tunnel access (*VISTA*) approach was developed to avoid complications with the intrasulcular tunneling method.[40]

## *VISTA sequence*

Initial preparation of recipient teeth includes thorough scaling and root planing, as well as odontoplasty to reduce any cervical prominence of roots that extend beyond the confines of the alveolar housing. Odontoplasty is performed using rotary finishing burs or ultrasonics with diamond-coated inserts. The roots are then conditioned for 2 minutes with 24% buffered EDTA gel to eliminate the smear layer. As illustrated in Fig. 32, the VISTA approach begins with a vertical access incision, depending on the sites being treated. The incision is made through the periosteum to elevate a subperiosteal tunnel, exposing the facial osseous plate as well as root dehiscences. This tunnel is extended at least one or two teeth beyond the tooth requiring root coverage, and the gingival margins are mobilized to facilitate coronal repositioning. The VISTA periosteal elevator (*VISTA 1, same manufacturer*) is introduced through the vestibular access incision and inserted between the periosteum and bone to elevate the periosteum, creating a subperiosteal tunnel. It is important to extend the tunnel elevation sufficiently beyond the mucogingival junction as well as through the gingival sulci of the teeth being augmented to allow for low-tension coronal repositioning of the gingiva. Use of an elevator with bayonet curves (*VISTA 2 and 3 from the same manufacturer*) facilitates access to the gingival sulcus and interproximal areas from the vertical incision. No surface incisions through the papillae should be made.

A fine-tipped curved serrated forceps may be used to insert the tuberosity graft inside the subperioteal tunnel. Alternatively, the graft may be guided using a lasso suture within the tunnel by inserting a 4.0 silk suture with a 22-mm 3/8 circle needle subperiosteally within the gingival sulcus of the most distal tooth and exiting through the midline access incision. The suture is then passed through the edge of the graft and returned through the same path of entry to exit from the distal tooth sulcus. Once the graft has been properly positioned, a horizontal mattress suture is applied to fix the relative position of the CTG and the buccal flap. Then the silk suture is removed and the graft is carefully repositioned below the gingival margin of the augmented tooth. The graft and flap are coronally advanced and anchored to the bracket with another horizontal mattress suture (*blue line*) (*Fig. 32f*). The VISTA sequence for orthodontically generated sites is summarized in Fig. 32, and a variation of the method is shown for sites there were not prepared with orthodontics (*Fig. 33*)

According to Prato et al.[41] 100% root coverage can be anticipated if the gingival margin is repositioned more than 2-mm coronally to the CEJ. If excessive

tension is detected during coronal repositioning, the subperiosteal tunnel is further elevated in all directions or additional sutures must be placed. The vertical incision is then approximated and sutured primarily, with multiple interrupted sutures. Sutures at the access incision may be removed after 1 week, but coronally anchored sutures are maintained until the 3-week postoperative visit. The extended period of gingival margin immobilization is required until the gingival margin is sufficiently healed to maintain the desired position.

The most commonly adopted surgeries for root coverage include the coronally advanced flap (*CAF*), intrasulcular tunneling techinque (*IST*) and subperiostral tunnel access (*VISTA*).[40] Sato[42] conducted a retrospective research comparing the efficacy of these three modalities (*CAF, IST, and VISTA*) for treating gingival recession defects. The mean root coverage achieved was 66% for IST (*median 67.4%*), 90.1% (*median 100%*) for VISTA, and 72.9% for CAF. Thus, VISTA was found to be the most effective intervention modality, especially in challenging situations with severe gingival defects (*Miller class III*).[42]

## Conclusion

When treating adults, the importance of interdisciplinary treatment cannot be overemphasized. Orthodontics may be necessary for preprosthetic alignment, but soft tissue augmentation and implantation are also required for managing multiple missing teeth. Without orthognathic surgery and miniscrews, facial esthetics were markedly improved by retracting the mandibular arch, but there was a compromise in the maxillary dental midline, because TADS were not used. Implantation and soft tissue grafting (*VISTA technique*) were successfully performed in a single surgery. Orthodontic implant site development precluded the need for bone grafting and a sinus lift procedure. Patients prefer minimally invasive treatment and this approach will undoubtedly increase in popularity.

## Acknowledgment

Thanks to Mr. Paul Head for proofreading this article.

## References

1. Huang C, Su C, Chang CH, Roberts WE. Bimaxillary protrusion with missing lower first molar and upper premolar: asymmetric extractions, anchorage control and interproximal reduction. Int J Orthod Implantol 2016;44:20-41.
2. Shih YH, Lin JJ, Roberts WE. Conservative management of class I crowded malocclusion complicated by severe maxillary protrusion, facial convexity and deepbite. Int J Orthod Implantol 2016;44:4-16.
3. Tseng L, Chang CH, Roberts WE. Congenital absence and microdontia of second premolars: orthodontics, implants and prosthetic dentistry. Int J Orthod Implantol 2016;43:4-27.
4. Chang MJ, Chang CH, Roberts WE. Acquired malocclusion due to early loss of permanent first molars: OBS-anchored orthodontics and implant-supported prostheses. Int J Orthod Implantol 2016;42:20-41.
5. Yeh HY, Chang CH, Roberts WE. Conservative treatment of periodontally compromised Class III malocclusion complicated

by early loss of lower first molars. Int J Orthod Implantol 2016;42:44-59.

6. Lee A, Chang CH, Roberts WE. Extraction treatment for an asymmetric class III/I malocclusion with blocked-out canine, bimaxillary crowding, midline deviation. Int J Orthod Implantol 2016;42:64-80.
7. Shih YH, Lin JJ, Roberts WE. Class II division 1 malocclusion with 5mm of crowding treated non-extraction with IZC miniscrews anchorage. Int J Orthod Implantol 2016;41:4-17.
8. Tseng LYL, Chang CH, Roberts WE. Diagnosis and conservative treatment of skeletal Class III malocclusion with anterior crossbite and asymmetric maxillary crowding. Am J Orthod Dentofac Orthop 2016;149:555-66.
9. Shih YH, Lin JJ, Roberts WE. Treatment of a class III malocclusion with anterior crossbite and deepbite, utilizing infrazygomatic (IZC) bone screws as anchorage. Int J Orthod Implantol 2015;40:4-14.
10. Lu SW, Chang CH, Roberts WE. Asymmetric crowded class II with missing first molars: space closure or implants? Int J Orthod Implantol 2015;40:18-41.
11. Chen HH, Chang CH, Roberts WE. Oligodontia and class III malocclusion treated with orthodontics, bone augmentation, and an implant-supported prosthesis. Int J Orthod Implantol 2014;36:52-69.
12. Zhu JF, Crevoisier R, King DL, Henry R, Mills CM. Posterior crossbites in children. Compend Contin Educ Dent 1996;17(11):1051-8.
13. Marinelli A, Mariotti M, Defraia E. Transverse dimensions of dental arches in subjects with Class II malocclusion in the early mixed dentition. Prog Orthod 2011;12(10):31-7.
14. Hsu E, Chang CH, Roberts WE. Cleidocranial dysplasia: surgical and orthodontic management of multiple impactions in the mandible. Int J Orthod Implantol 2016;42:84-96.
15. Chang A, Chang CH, Roberts WE. Class III malocclusion with camouflage treatment and implant site development. Int J Orthod Implantol 2015;39:24-49.
16. Yeh HY, Chang CH, Roberts WE. Conservative treatment of periodontally compromised class III malocclusion complicated by early loss of lower first molars. Int J Orthod Implantol 2016;42:44-59.
17. Roberts WE, Viecilli RF, Chang CH, Katona TR, Paydar NH. Biology of biomechanics: finite element analysis of a statically determinate system to rotate the occlusal plane for correction of skeletal Class III malocclusion. Am J Orthod Dentofacial Orthop 2015;148:943-955.
18. Roberts WE, Nelson CL, Goodacre CJ. Rigid implant anchorage to close a mandibular first molar extraction site. J Clin Orthod 1994;28(12):693-704.
19. Chang MJ, Chang CH, Roberts WE. Acquired malocclusion due to early loss of permanent first molars: OBS-anchored orthodontics and implant-supported prostheses. Int J Orthod Implantol 2016;42:20-41.
20. Pitiphat W, Savisit R, Chansamak N, Subarnbhesaj A. Molar incisor hypomineralization and dental caries in 6-7 year old Thai children. Pediatric Dentistry 2014;36(7):478-82.
21. Wuollet E, Laisi S, Salmela E, Ess A, Alaluusua S. Background factors of molar-incisor hypomineralization in a group of Finnish children. Acts Odontol Scand 2014;72(8):963-9.
22. Silva MJ, Scurry KJ, Craig JM, Manton DJ, Kilpatrick N. Etiology of molar-incisor hypoplasia-a systematic review. Community Dent Oral Epidermiol 2016;44(4):342-53.
23. Lang J, Birkenbeil S, Bock S, Heinrich-Weltzien R, Kronmeyer-Hauschild K. Dental defects in German medieval and early-modern age populations. Anthropoid Anz. 2016 [Epub ahead of print].
24. Roberts WE, Arbuckle GR, Analoui M. Rate of mesial translation of mandibular molars using implant-anchored mechanics. Angle Orthod 1996;66(5):331-338.
25. Kuftinec M, Glass R. Stability of the IMPA with Reference to the Begg method. Angle Orthod 1971;41(4): 264-270.
26. Armbruster P, Gardiner D, Whitley J, Fierra J. The congenitally missing upper lateral incisor: Part 1: esthetic judgment of treatment options. World J Orthod 2005;6:369-75.
27. Armbruster P, Gardiner D, Whitley J, Fierra J. The congenitally missing upper lateral incisor: Part 2: assessing dentist's preferences for treatment. World J Orthod 2005;6:369-75.
28. Zachrisson B. Improving orthodontic results in cases with maxillary incisors missing. Am J Orthod Dentofacial Orthop 1978;73:274-89.
29. Kokich Jr V, Kinzer G. Managing congenitally missing lateral incisors. Part 1: canine substitution. J Esthet Restor Dent 2005;17:5-10.
30. McNeill R, Joondeph D. Congenitally absent maxillary lateral incisorsLtreatment planning considerations. Angle Orthod 1973;43:24-9.

31. Araujo M, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Perio 2005;32:212-218.
32. Hammerle C, Araujo M, Siminion M. Evidence-based knowledge on the biology and treatment of extraction sockets. Clin Oral Implants Res 2012;23:80-82.
33. Lindhe J, Denis C, Mauro D, Cristiano T, Birgitta L. Ridge preservation with the use of deproteinized bovine bone mineral. Clin Oral Implants Res 2014;25(7):761-878.
34. Kokich V. Maxillary lateral incisor implants: planning with the aid of orthodontics. Int J Oral Max Surg 2004;62:48-56.
35. Zachrisson B. Orthodontic tooth movement to regenerate new alveolar tissue and bone for improved single implant aesthetics. Eur J Orthod 2003;25:442.
36. Novackova S, Marek I, Kaminek M. Orthodontic tooth movement: bone formation and its stability over time. Am J Orthod Dentofacial Orthop 2011;139(1):37-43.
37. Lindskog-Stokland B, Hansen K, Ekestubbe A, Wennstrom J. Orthodontic tooth movement into edentulous ridge areas-a case series. Eur J Orthod 2013;35(3):277-85.
38. Roccuzzo M, Bunino M, Needleman I, Sanz M. Periodontal plastic surgery for treatment of localized gingival recessions: A systematic review. J Clin Periodontol 2002;29(suppl 3):178–194.
39. Oates T, Robinson M, Gunsolley JC. Surgical therapies for the treatment of gingival recession. A systematic review. Ann Periodontol 2002;3:303–320.
40. Zadeh H. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet-derived growth factor BB. Int J Periodontics Restorative Dent 2011;31(6):653-60.
41. Prato P, Baldi C, Nieri M, Franseschi D, Cortellini P, Clauser C, Rotundo R, Muzzi L. Coronally advanced flap: the post-surgical position of the gingival margin is an important factor for achieving complete root coverage. J Periodontol 2005;76(5):713-22.
42. Sato S. A retrospective study analysis of the outcome of three methods used for the gingival recession defects. USC graduate thesis. 2014.


# Discrepancy Index Worksheet

**TOTAL D.I. SCORE** 27

## OVERJET

| | | |
|---|---|---|
| 0 mm. (edge-to-edge) | = | 1 pt. |
| 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 = 11

## OVERBITE

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

Total = 0

## ANTERIOR OPEN BITE

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

Total = 0

## LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

## CROWDING (only one arch)

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

Total = 2

## OCCLUSION

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

Total = 4

## LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

## BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

## CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° 0 = 0 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

Each degree > 38° 1 x 2 pts. = 2

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

Each degree > 99° _____ x 1 pt. = 0

Total = 4

## OTHER (See Instructions)

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

Identify:

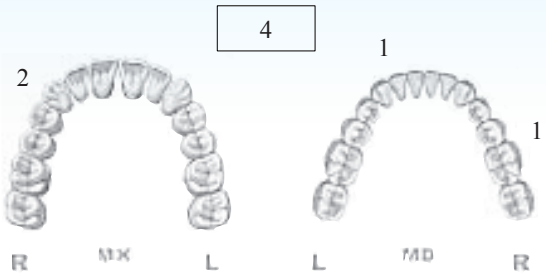
Total = 6

# Cast-Radiograph Evaluation

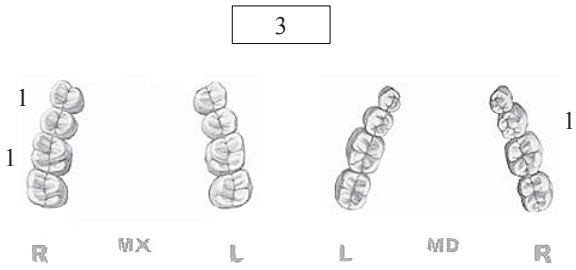
**Case #** **Patient**

**Total Score:** 22

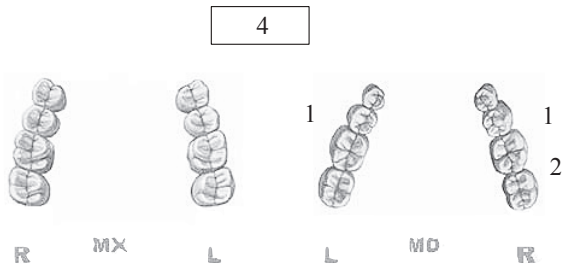
## Alignment/Rotations




## Marginal Ridges

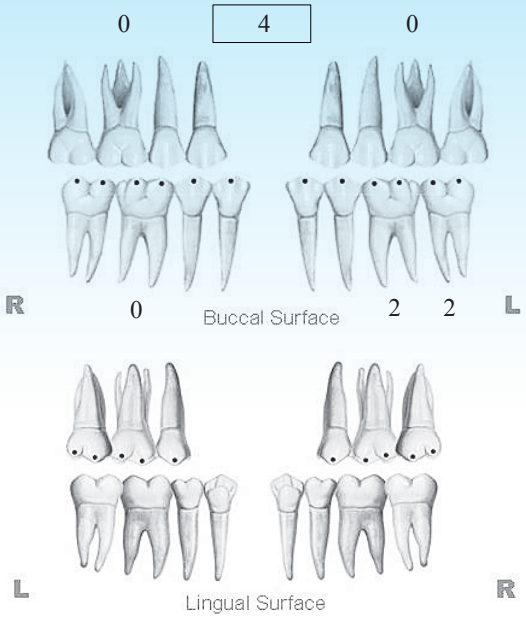



## Buccolingual Inclination

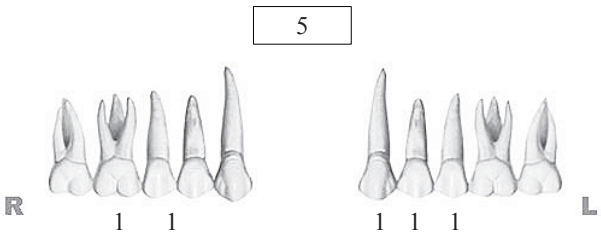



## Overjet

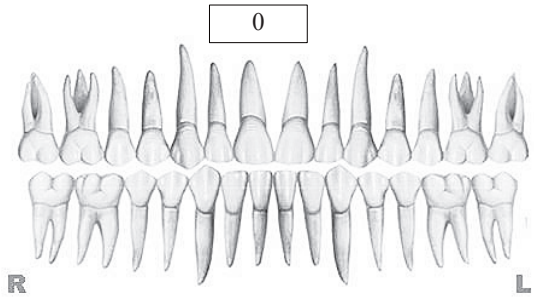

## Occlusal Contacts



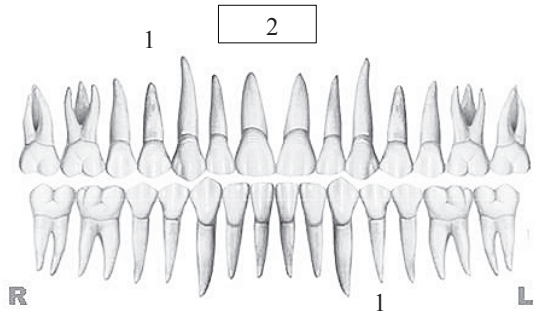

## Occlusal Relationships




## Interproximal Contacts




## Root Angulation



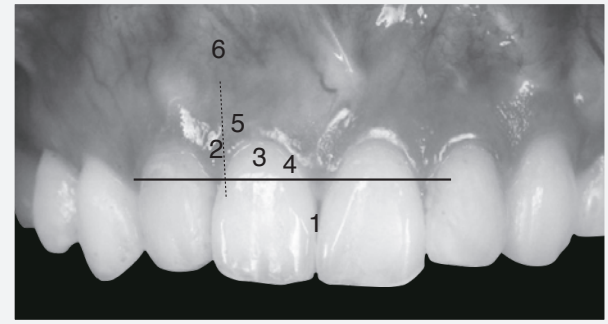

***INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.***

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

**Total Score: =** 8

## 1. Pink Esthetic Score

*Total =* 2

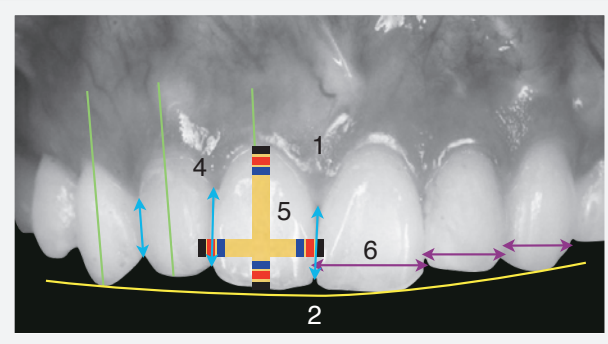



| | | | |
|---|---|---|---|
| 1. Mesial Papilla | 0 | 1 | 2 |
| 2. Distal Papilla | 0 | 1 | 2 |
| 3. Curvature of Gingival Margin | 0 | 1 | 2 |
| 4. Level of Gingival Margin | 0 | 1 | 2 |
| 5. Root Convexity ( Torque ) | 0 | 1 | 2 |
| 6. Scar Formation | 0 | 1 | 2 |

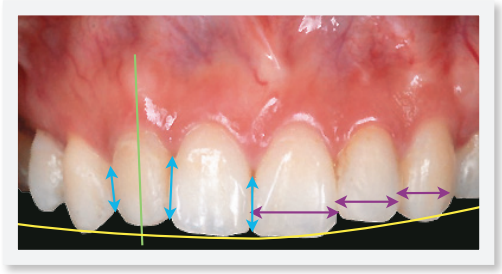
| | | | |
|---|---|---|---|
| 1. M & D Papilla | (0) | 1 | 2 |
| 2. Keratinized Gingiva | (0) | 1 | 2 |
| 3. Curvature of Gingival Margin | (0) | 1 | 2 |
| 4. Level of Gingival Margin | 0 | 1 | (2) |
| 5. Root Convexity ( Torque ) | (0) | 1 | 2 |
| 6. Scar Formation | (0) | 1 | 2 |

## 2. White Esthetic Score ( for Micro-esthetics )

*Total =* 6



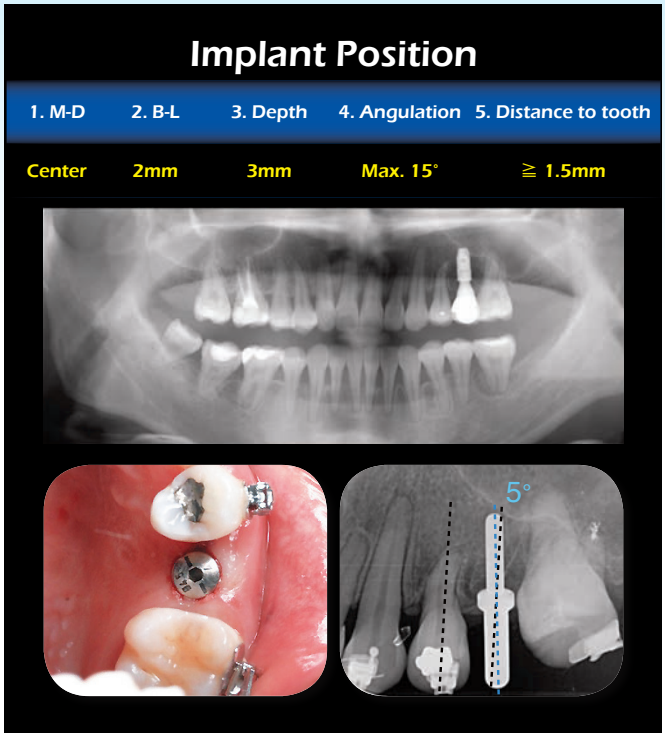

| | | | |
|---|---|---|---|
| 1. Midline | 0 | 1 | 2 |
| 2. Incisor Curve | 0 | 1 | 2 |
| 3. Axial Inclination (5°, 8°, 10°) | 0 | 1 | 2 |
| 4. Contact Area (50%, 40%, 30%) | 0 | 1 | 2 |
| 5. Tooth Proportion (1:0.8) | 0 | 1 | 2 |
| 6. Tooth to Tooth Proportion | 0 | 1 | 2 |



| | | | |
|---|---|---|---|
| 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 |

# Implant-Abutment Transition & Position Analysis

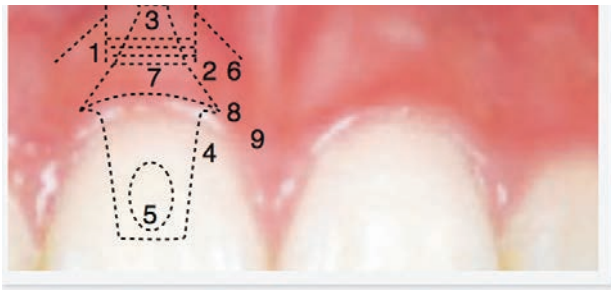
## 3. Implant Position




Total = 0

| | | | |
|---|---|---|---|
| 1. M & D ( Center ) | 0 | 1 | 2 |
| 2. B & L ( Buccal 2 mm ) | 0 | 1 | 2 |
| 3. Depth ( 3 mm ) | 0 | 1 | 2 |
| 4. Angulation ( Max. 15° ) | 0 | 1 | 2 |
| 5. Distance to Adjacent Anatomy | 0 | 1 | 2 |

| | | | |
|---|---|---|---|
| 1. M & D ( Center ) | (0) | 1 | 2 |
| 2. B & L ( Buccal 2 mm ) | (0) | 1 | 2 |
| 3. Depth ( 3 mm ) | (0) | 1 | 2 |
| 4. Angulation ( Max. 15° ) | (0) | 1 | 2 |
| 5. Distance to Adjacent Anatomy | (0) | 1 | 2 |




Total = 1

| | | | | | |
|---|---|---|---|---|---|
| 1. Fixture Cervical Design | N | Y | | | |
| 2. Platform Switch | N | Y | | | |
| 3. I-A Connection Type | E | I | | | |
| 4. Abutment Selection | S | C | | | |
| 5. Screw Hole Position | P | B | | | |
| 6. Marginal Bone Loss | N | Y | 0 | 1 | 2 |
| 7. Modified Gingival Contour | N | Y | 0 | 1 | 2 |
| 8. Gingival Height | N | Y | 0 | 1 | 2 |
| 9. Crown margin fitness | N | Y | 0 | 1 | 2 |


| | | | |
|---|---|---|---|
| 1. Fixture Cervical Design | N | (Y) | bone level |
| 2. Platform Switch | N | (Y) | platform |
| 3. I-A Connection Type | E | (I) | 11° morse taper |
| 4. Abutment Selection | S | (C) | cement-retained |
| 5. Screw Hole Position | P | B | absent |
| 6. Marginal Bone Loss | N | Y (0) | 1 2 |
| 7. Modified Gingival Contour | N | Y 0 | (1) 2 |
| 8. Gingival Height | N | Y (0) | 1 2 |
| 9. Crown margin fitness | N | Y (0) | 1 2 |

# 2017 一年一度 DAMON MASTER PROGRAM in Hsinchu

全新的2017貝多芬高效 Damon 矯正大師系列課程是由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧。此外，透過數位影片反覆觀看，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。

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！

時間：週四全天（9 am - 5 pm），每月一次。
地點：金牛頓藝術科技（新竹市建中一路25號2樓）

## Year 1

Module 1 - **5/4**
1. Selecting your ideal first case
2. Bonding position
3. Four stages of efficient orthodontic treatment
4. Case consultation & discussion
5. Hands-on: bonding + BT + Ceph tracing

Practice: Clinical photography

Module 2 - **6/8**
1. Simple and effective anchorage system
2. Extraction vs. Non-extraction analysis
3. Case consultation & discussion
4. Hands-on: TADs + space closing + hook + spring

Practice: Ceph tracing;
Filing patient photo records (template)

Module 3 - **7/6**
1. Damon diagnosis & fine-tuning
2. Checklist for finishing
3. Case consultation & discussion
4. Hands-on: Finishing bending & fixed retainer

Practice: Editing patient photo records (use own data); Morph

Module 4 - **8/10**
1. Excellent finishing & case report demo
2. Retention & relapse: case demo
3. Case consultation & discussion
4. Hands-on: Presentation demo

Practice: Demo case report

Module 5 - **9/28**
1. Orthodontic biomechanics & diagnostic analysis
2. Soft & hard tissue diagnostic analysis
3. Children & adult orthodontics and diagnostic analysis
4. Case consultation & discussion

Practice: Case report

Module 6 - **To be announced**
Chairside observation & clinic management

Practice: Clinical photography

Practice Time: 1:00 - 2:30 pm

## Year 2

Module 1 - **10/6**
1. Crowding: Extraction vs. Non-extraction
2. Upper impaction
3. Lower impaction
4. Case consultation & discussion

Literature review: Bracket placement; Impacted canines

Module 2 - **11/9**
1. Missing teeth: Anterior vs. Posterior
2. Crossbite: Anterior vs. Posterior
3. Case consultation & discussion

Literature review: Canine substitution; Missing 2nd premolar

Module 3 - **12/21**
1. Open bite- High angle & Deep bite - Low angle
2. ABO DI, CRE workshop
3. Case consultation & discussion

Literature review: DI & CRE review

Module 4 - **2018/1/4**
1. Gummy smile and canting
2. Esthetic finishing(transposition)
3. Case consultation & discussion

Literature review: Excellence in finishing (occlusion, esthetics, perio)

Module 5 - **2018/2/1**
1. Implant-ortho combined treatment
2. Interdisciplinary treatment-adult complex cases
3. Case consultation & discussion

Literature review: IDT

Literature review: 1:00-2:00 pm

第一年費用含課程視訊、iPad、課程電子書、模型及材料；
第二年費用含視訊、ABO量尺、課程電子書。

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

# International Beethoven Workshop

Dental Clinic Established 1996

## 2017 Session A: 05/16-19 Session B: 11/28-12/1 @Taiwan


Since 2009, Beethoven International Damon, OBS & VISTA Workshop has received over 350 participants from more than 30 countries. This three-day advanced hands-on course combines practical lectures and in-office clinical learning and has attracted orthodontic practitioners worldwide to strengthen their skills and knowledge in the Damon System, TADs and minimally invasive surgeries. In addition to clinical development, participants will be exposed to clinic management and staff training of a world-class orthodontic centre. The optional Keynote workshop will help improve your ability to master professional digital communication. Come join us and be part of a community of excellence.

VISTA
Vertical Incision Subperiosteal Tunnel Access

## THE LECTURERS

### Dr. Chris Chang

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

### Dr. John Lin

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

FEES

Day 123 USD 2,600 Early bird rate: $200 off by 2016/8/18; 2017/3/16, 9/28

Day 4 USD 500 Early bird rate: $100 off by 2016/8/18; 2017/3/16, 9/28

For more information and registration, visit

http://iworkshop.beethoven.tw

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

# International Beethoven Dental Clinic Established 1996 Workshop

Dr. David Nissan
Mexico

"More than I expected"

Dr. Lee Hye Jin Serena
Argentina

"Dr. Chris shared his knowledge in details and made the difficult cases look simple."

Dr. Sunish T Daniel
Dubai

"The workshop, all and all was an wholesome experience and I would definitely recommend this course to my friends."

Dr. Joanna Lim
Singapore

"Truly inspirational"

Prof. Dr. Paulo Fernandes Retto
Portugal

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

Dr. Amr ElDaly
Australia

"Amazing experience"

Dr. Chen Yehong
Malaysia

"The best & smartest choice ever"

Dr. Alejandro Ramírez
Spain

"The best workshop in the world"

## Course Schedule

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

### VISTA

This 4-hour hands-on surgical workshop features minimally invasive procedures for impactions and soft tissue enhancement.

Topics include:

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

### Keynote

Dr. Rungsi Thavarungkul, Thailand
Lecturer, Advanced Keynote Workshop

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

# Convex, Class II, Deepbite, Gummy Smile and Lingually Tipped Incisors: Conservative Correction with Bone Screws and a Crown Lengthening Procedure


## Abstract

***Introduction**: A 26-year-old female sought orthodontics consultation for nonextraction treatment to correct unsatisfactory facial and dental esthetics. She attributed her concerns to a protrusive upper lip and gummy smile.*

***Diagnosis**: Severe facial convexity (28%) and increased lower facial height (57.6%) was associated with a protrusive maxilla (SNA 85º), retrusive mandible (SNB 75º), Class II occlusion, high mandibular plane angle (FMA 33º), 100% deepbite, lingually tipped maxillary incisors (U1 to SN 88º), asymmetric gummy smile, and extrusion of the maxillary incisors.*

***Etiology**: This complex malocclusion was consistent with a functional retrusion and clockwise rotation of the mandible, due to the lingual orientation of the upper incisors ("locked-in bite").*

***Treatment**: Initial bite opening was with bite turbos on the upper maxillary canines that were then transferred to the adjacent central incisors, after they were aligned. Both arches were aligned with a passive self-ligating (PSL) fixed appliance. Class II correction was accomplished with intermaxillary elastics, and osseous anchorage provided by maxillary bone screws, placed apical to the incisors and buccal to the molars. Following alignment, surgical crown lengthening was performed in the maxillary anterior segment, and 6 months later the gingival contours were refined with a diode laser.*

***Result**: Facial esthetics were improved by decreases in facial height (5º) and facial convexity (3%), as well as correction of the asymmetric gummy smile and lip competence. In 30 months, this severe malocclusion, with a Discrepancy Index (DI) of 27, was treated to an excellent Cast-Radiograph Evaluation (CRE) of 24, and a pleasing Pink & White Esthetic Score of 3. The facial and dental results were stable at the six month follow-up evaluation. (Int J Orthod Implantol 2017;45:60-81)*



***Key words:***
*Asymmetry, Gummy smile, deepbite, Class II malocclusion, self-ligating brackets, bite-turbos, temporary anchorage devices, arch retraction, surgical crown lengthening, infrazygomatic crest, extra-alveolar, bone screws*


## History and Etiology

The chief complaints of this 26-year-old woman were maxillary protrusion and an unattractive smile. She preferred conservative treatment without extractions or orthognathic surgery. No contributing medical, dental, or family history was reported. She presented with maxillary protrusion, prominent upper lip, severe facial convexity, and a hyperactive mentalis muscle, when lips were closed (*Fig. 1*). Asymmetric, excessive gingival display (*"gummy smile"*) was noted when the patient was smiling (*Fig. 2*). Intraoral examination revealed decreased clinical crown height in the esthetic zone (*maxillary anterior segment*). Moderate crowding in the mandibular anterior region (*Fig. 3*), and deepbite with 3-mm of overjet (*Fig. 4*) were noted.

**Dr. Chang-Kai Chen,**
*Lecturer, Beethoven Orthodontic center (Left)*

**Dr. Angle Lee,**
*Director, Bell Dental Clinic*
*Editor, International Journal of Orthodontics & Implantology (Center Left)*

**Dr. Chris Chang,**
*Founder, Beethoven Orthodontic Center*
*Publisher, International Journal of Orthodontics & Implantology (Center Right)*

**Dr. W. Eugene Roberts,**
*Editor-in-chief, International Journal of Orthodontics & Implantology (Right)*

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

*Fig. 2:*
*Gummy smile, asymmetrical gingival display, and cant of the occlusal plane*

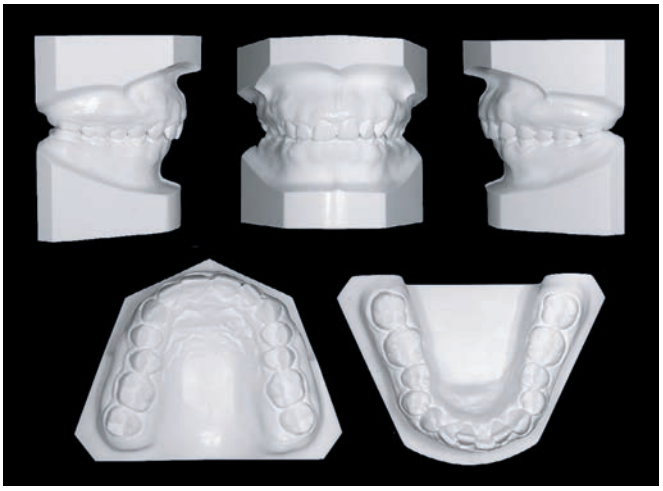


*Fig. 3: Pre-treatment dental models (casts)*

*Fig. 4:*
*Impinging (100%) deepbite and lingually tipped maxillary incisors*

*Fig. 5:*
*Pre-treatment lateral cephalometric radiograph showed lingually tipped maxillary incisors.*

Radiographic documentation is provided by lateral cephalometric (*Fig. 5*) and panoramic (*Fig. 6*) films. Cephalometric analysis is summarized in Table 1. Diagnostic details are outlined below.

## Diagnosis

Skeletal:

- Maxillary protrusion and mandibular retrusion (*SNA 85°, SNB 75°, ANB 10°*)
- Steep mandibular plane angle (*SN-MP 40°, FMA 33°*)

Dental:

- End-on Class II molar relationships
- Class II canine relationships
- 100% impinging deepbite

*Fig. 6: Pre-treatment panoramic radiograph shows both condylar heads outlined in yellow.*

Facial:

- Convex profile
- Everted lower lip
- Hypermentalis activity with lips closed

The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 27 as shown in the subsequent worksheet.

## Treatment Objectives

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: *Anterior by decreasing the vertical dimension of the occlusion (VDO)*
- Vertical: *Decreased by closing the VDO*
- Transverse: *Maintain*

| CEPHALOMETRIC | | | |
|---|---|---|---|
| SKELETAL ANALYSIS | | | |
| | PRE-Tx | POST-Tx | DIFF. |
| *SNA° (82°)* | 85˚ | 82˚ | 3˚ |
| *SNB° (80°)* | 75˚ | 75.5˚ | 0.5˚ |
| *ANB° (2°)* | 10˚ | 6.5˚ | 3.5˚ |
| *SN-MP° (32°)* | 40˚ | 39.5˚ | 0.5˚ |
| *FMA° (25°)* | 33˚ | 32.5˚ | 0.5˚ |
| DENTAL ANALYSIS | | | |
| U1 TO NA mm *(4 mm)* | -3 mm | -1 mm | 2mm |
| *U1 TO SN° (110°)* | 88˚ | 103˚ | 15˚ |
| L1 TO NB mm *(4 mm)* | 9 mm | 8 mm | 1mm |
| *L1 TO MP° (90°)* | 98˚ | 103˚ | 5˚ |
| FACIAL ANALYSIS | | | |
| E-LINE UL *(2-3 mm)* | 0 mm | -2 mm | 2 mm |
| E-LINE LL *(1-2 mm)* | 2 mm | 0 mm | 2 mm |
| *Convexity: G-Sn-Pg' (13°)* | 28˚ | 23˚ | 5˚ |
| *%FH: Na-ANS-Gn (53%)* | 57.6% | 54.9% | 2.7% |

Table 1: Cephalometric summary

Maxillary Dentition

- A - P: *Retract*
- Vertical: *Intrude molars*
- Inter-molar / Inter-canine Width: *Maintain*

Mandibular Dentition

- A - P: *Maintain*
- Vertical: *Intrude incisors to correct curve of Spee*
- Inter-molar / Inter-canine Width: *Maintain*

**Facial Esthetics:** Retract the everted lower lip

## Treatment Plan

Non-extraction treatment with passive self-ligating (*PSL*) brackets was indicated. Because of the labially inclined lower incisors, use Class II elastics sparingly, for correction of the sagittal discrepancy. Use temporary anchorage devices (*TADs*) to retract the maxillary incisors and increase their axial inclination. Provide bilateral extra-alveolar (*E-A*) anchorage with infrazygomatic crest (*IZC*) bone screws. Prevent extrusion of the maxillary anterior segment as it is retracted, by placing interradicular (*I-R*) miniscrews between the roots of the upper incisors. Upon completion of active treatment, remove fixed appliances, and perform surgical crown lengthening in the maxillary anterior segment. Retain with clear overlay retainers for both arches.

## Treatment Progress

A full fixed appliance with 0.022-in slot Damon Q® brackets (*Ormco, Glendora, CA*) was used with the archwires and accessories, as specified by the manufacturer. High torque brackets were chosen for the maxillary anterior segment to increase axial inclination. Low torque brackets were chosen for the mandibular incisors to prevent flaring, due to correction of crowding and the use of the Class II elastics. The archwire sequence in the upper was: 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, 0.016x0.025-in SS, 0.019x0.025-in SS. For the lower arch, the progression of archwires was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, 0.016x0.025-in SS.

In the 2nd month of treatment, two anterior bite-turbos (*BTs*) were bonded on maxillary canines to help correct the 100% deepbite (*Fig. 7*). In the 8th month, Class II elastics (*Fox 1/4-in, 3.5-oz*) were used to assist in correction of the Class II molar and canine relationships (*Fig. 8*).


*Fig. 7:*
*In the 2nd month, two anterior BTs were bonded on maxillary canines to help correct the 100% deepbite.*

In the 19th month, a 2x12-mm bone screw (*OrthoBoneScrew® Newton's A Ltd, Hsinchu City, Taiwan*) was placed in each IZC for E-A anchorage. Retracting the entire maxillary dentition with IZC anchorage extrudes maxillary incisors and rotates the arch posteriorly. Two 1.5x8-mm miniscrews made by the same manufacturer (*Newton's A Ltd, Hsinchu City, Taiwan*) were inserted between the upper central and lateral incisors (*Fig. 9*) to prevent extrusion in the maxillary anterior segment[1] (*Fig. 10*). With these mechanics, the entire maxillary dentition was retracted and aligned, while extrusion was controlled with anterior and posterior TADs. In the 29th month of treatment, the anterior miniscrews were removed and the upper arch wire (*0.019x0.025-in SS*) was expanded to correct a posterior crossbite tendency.

## Surgical Crown Lengthening

In the 29th month, the short anterior crowns appeared even shorter because of the gingival inflammation associated with fixed appliances (*Fig. 11*). Surgical crown lengthening was performed prior to removing the brackets to obtain proper clinical crown height and re-establish biological width at a more apical level. The stepwise procedure is described below.

First, the dentogingival complex was measured on each tooth by bone sounding under local anesthetic. This diagnostic procedure reveals the level of the cementoenamel junctions (*CEJ*) relative to the alveolar crest.

Second, the width of keratinized gingiva was checked. Although not essential for periodontal


*Fig. 8: In the 8th month, Class II elastics were used to correct the Class II molar and canine relationships.*


*Fig. 9:*
*Two I-R miniscrews are placed between the central and lateral incisors, and they deliver force of 60~80 gm (cN) gm per side. Two IZC miniscrews were inserted and loaded with 280 gm (cN) per side.*

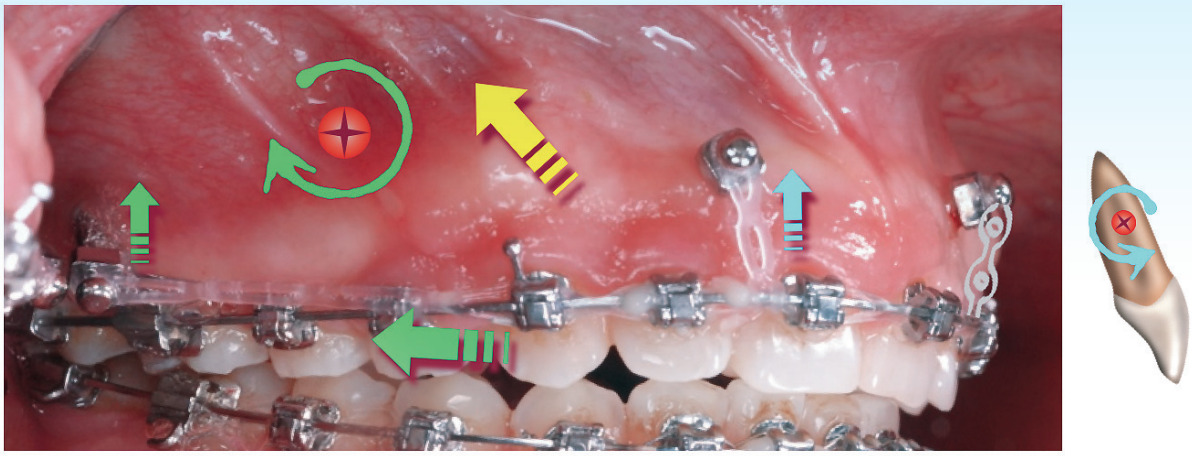


*Fig. 10:*
*The presumed force system is diagrammed for the IZC bone screws and I-R miniscrews. The right blue straight arrow indicates the intrusive force anchored by the I-R miniscrews. In the illustration to the right, the blue circular arrow shows a moment relative to the $C_R$ (X in a red dot) of the incisal root that flares the maxillary incisors. The horizontal green arrow is the retraction force to the canines that is anchored by the IZC miniscrew. The vertical green arrow is the intrusive component on the posterior maxillary segment that is provided if the IZC bone screw is engaged. The green circular arrow around the $C_R$ of the maxillary arch (black cross in a red dot) represents the moment of the retraction force due to the force applied to the canines from the IZC bone screws. The large yellow arrow is the net resultant force on the maxilla based on the presumed $C_R$.*

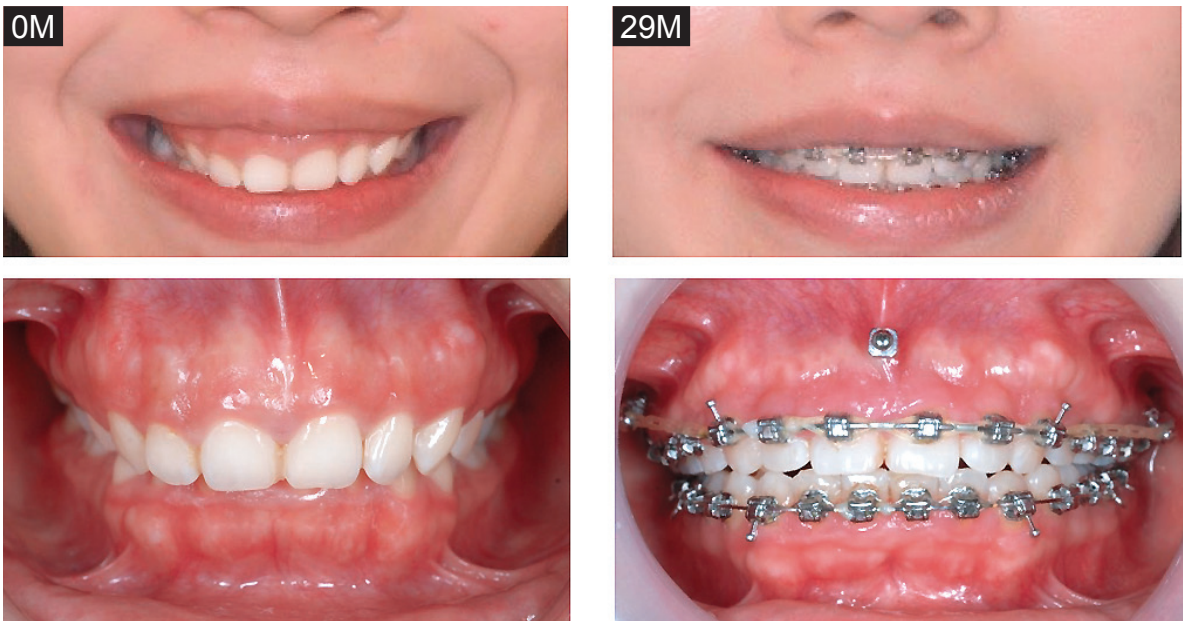



*Fig. 11:*
*Gummy smile is shown at the start of treatment (0M) in the facial (upper left) as well as the intraoral views (lower left). The 100% deepbite was improved at 29 months (29M). A single I-R miniscrew (lower right) was placed between the central incisor roots at 23 months, because one of the original miniscrews placed between the central and lateral incisor roots at 19 months failed.*

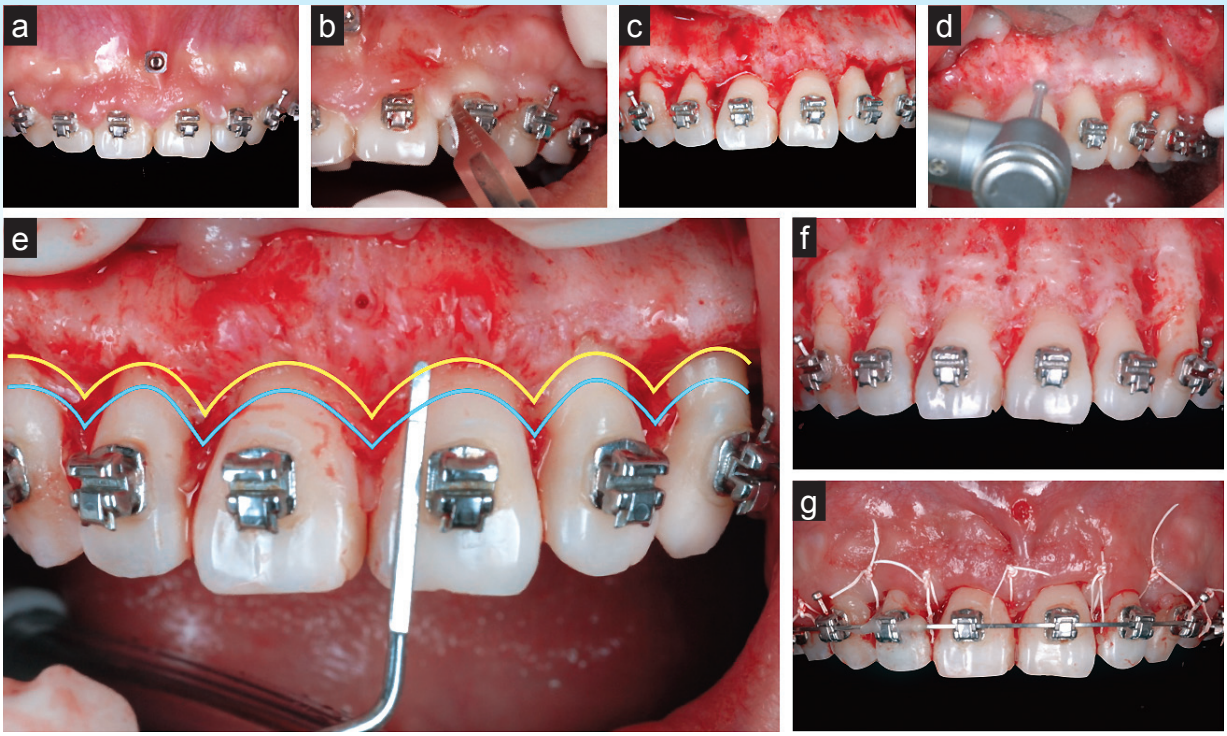



*Fig. 12:*
*The crown-lengthening surgical procedure is illustrated: (a) short clinical crowns with excessive gingival display, (b) marginal and submarginal incisions, (c) a full-thickness flap is reflected, (d) bone is removed at the alveolar crest with a #5 round carbide bur, (e) a uniform 2-mm biological zone is established for soft tissue attachment between the CEJ (blue line) to the alveolar crest (yellow line), (f) alveolar bone is contoured and festooned, and (g) the flap is repositioned and sutured.*

health, it is difficult to maintain a healthy dentition if the keratinized gingiva is less than 2-mm wide for any tooth. An apically positioned flap is indicated to increase the width of attached gingiva. Gingivectomy is preferable for increasing crown height if there is adequate gingiva, occlusal to the epithelial attachment.

Third, a full-thickness mucoperiosteal flap was reflected to examine the alveolar crest and CEJ for all teeth under treatment. It is important to identify all areas where the alveolar crest is <2-mm from the CEJ (*Figs. 12b-c*).

Fourth, bone was removed with a #5 round carbide bur to establish a uniform 2-mm wide zone between the alveolar crest and CEJ. This bone-free attachment zone is critical for establishing a healthy biologic


*Fig. 13:*
*At thirty months (30M), 6 months post-operative for the crown-lengthening procedure, all fixed appliances were removed, and irregularities were noted in the gingival margins. Gingival recontouring was accomplished with a diode laser at the 6 months post-treatment follow-up (6M-F/u).*

*Fig. 14: 6-month post-treatment follow-up facial and intraoral photographs, gingival recontouring was accomplished with a diode laser.*

width and optical clinical crown height, for all teeth treated requiring crown lengthening (*Figs. 12d-f*).

Following the ostectomy procedure, the tissue is repositioned slightly coronal to the CEJ and sutured with #4 Gore-Tex® sutures (*Gore Medical Products, Flagstaff, AZ*) (*Fig. 12g*). The gingiva usually heals with minimal coronal or apical movement of the repositioned soft tissue flap. It is often necessary to perform minor adjustments of gingival height and contour with a diode laser about 6 months post-operatively (*Fig. 13*).

*Fig. 15: Post-treatment dental models (casts)*

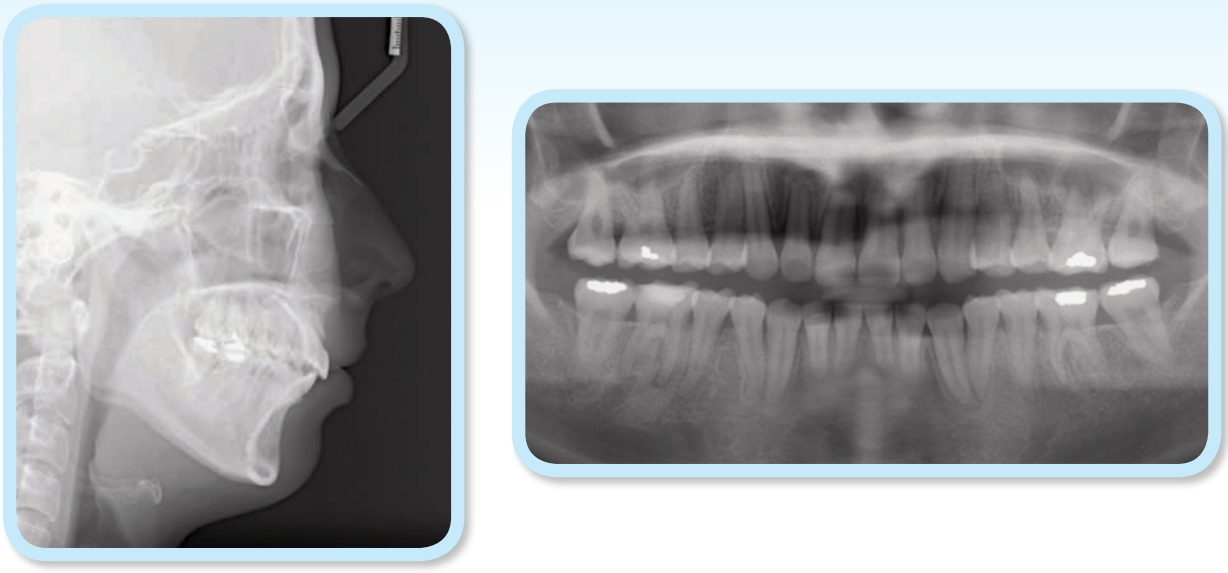


*Fig. 16:*
*Post-treatment cephalometric (left) and panoramic (right) radiographs. See text for details.*

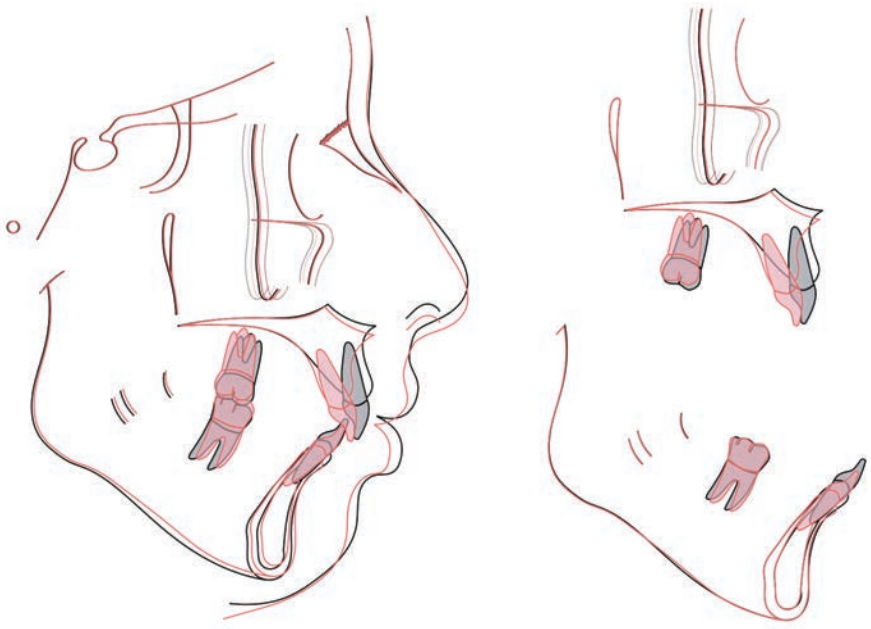


*Fig. 17:*
*Superimposed pre-treatment (black) and post-treatment (red) cephalometric tracings are superimposed on the anterior cranial base (left), maxilla (upper right), and mandible (lower right). See text for details.*

After 30 months of active treatment, all fixed appliances were removed and clear overlay retainers were delivered. The patient was instructed to wear the retainers full time for the first 6 months and nights only thereafter. Home care and retainer maintenance instructions were provided.

## Treatment Results

Interdisciplinary therapy with orthodontics and surgical crown lengthening produced an optimal result as documented in Figs. 14-15. The cephalometric and panoramic radiographs document the post-treatment results (*Fig. 16*). Superimposition of cephalometric tracings before and after treatment reveal the dentoalveolar changes (*Fig. 17*). The patient's lips were competent and protrusion was decreased. Facial convexity was improved ~5° when the head films were measured directly. Hypermentalis activity (*"golf-ball chin"*) was reduced by a slight decrease in the VDO and correction of the lower lip eversion. These changes were not as obvious in the cephalometric superimpositions because of soft-tissue smoothing of the automated superimposition process. Improved intermaxillary alignment, particularly the correction of the impinging deepbite and lingually inclined upper incisors, provided for a mutually protected occlusion and more efficient mastication.

The final panoramic radiograph (*Fig. 16*) revealed moderate external apical root resorption of the four maxillary incisors, consistent with the intrusion mechanics (*Fig. 10*). The lower right first molar has an asymptomatic endodontic problem, evidenced by a periapical radiolucent lesion on the mesial molar, that was associated with condensing osteitis (*Fig. 16*). In retrospect, the lesion may have been present in a less obvious form at the start of treatment (*Fig. 6*). An endodontics evaluation is indicated.

ABO Cast-Radiograph Evaluation (*CRE*) score was 24 points which was an excellent result for a severe malocclusion with a DI of 27. The major CRE discrepancies were: alignment/rotations (*8 points*), occlusal contact (*4 points*) and occlusal relationship (*6 points*). The Pink & White Esthetic score was 3 reflecting problems with mesial and distal papillae, incisal edge curvature, and incisal contact areas. The surgical crown lengthening resulted in pleasing crown heights. Six months post-operatively, irregular gingival margins were corrected with a diode laser. Overall, the maxillary incisors were prevented from extruding and the upper molars were slightly intruded. The gummy smile, everted lower lip, and facial convexity were significantly improved (*Fig. 14*). The patient was satisfied with the result.

## Discussion

Patients are often concerned about dentofacial esthetics because a pleasant smile conveys a friendly nature, happiness and confidence. The smile is an important non-verbal communication that is an esthetic interaction between the lips, teeth and gingiva.[1] In western culture, a smile line with minimal gingival display is desirable. Excessive gingival exposure when smiling is commonly

referred to as a "gummy smile." This is a relatively common condition affecting about 7% of men and 14% of women aged 20-30 years.[2]

The maxillary exposure, gingival margin to lip distance, was evaluated to determine when a "*gummy smile*" becomes unattractive. Orthodontists rated 2-mm[3] to 3-mm[4] of gingival exposure as unattractive, but general dentists and laypeople feel that 4-mm is required to rate a smile as unattractive.[3] The physiologic reasons for a gummy smile include excessive vertical growth of the maxilla, extrusion of maxillary incisors, incomplete exposure of the anatomic crowns of teeth, hyperactivity of the elevator muscles of the upper lip, or a combination of all of these factors.[5-7] Excessive gingival display is a clinical impression with a highly variable etiology.

## Gummy Smile

### • Extra-Oral Component

Contributing factors to gummy smile are a short and/or hypermobile upper lip, anterior dentoalveolar extrusion and vertical maxillary excess.

1. **Short upper lip**: Excessive gingival display is a frequent consequence of short upper lip, as measured from subnasale (*Sn*) to the inferior border of the lip (*Fig. 18*). The average length of the maxillary lip is 20~22-mm for young adult females, and 22~24-mm for young adult males.[8] Individuals with less than ~20-mm of lip length are usually classified as having a short lip.
2. **Hypermobility**: The upper lip is excessively elevated by functional contraction of the lip elevator muscles[9] and often results in excessive gingival display when smiling. A hypermobile upper lip is considered the primary etiologic factor for excessive gingival display, when the maxillary lip length is within the normal range, and the lower third of the face is within normal limits (*WNL*). Effective treatment for most types of gummy smile are well documented,[5,9-14] but short hypermobile lips continue to be a challenging problem. Recently, the injection of botulinum toxin type A has been suggested as a temporary treatment.[15]
3. **Incisor exposure at rest**: The lips are incompetent if they do not touch at rest. If incisor exposure is more than 2-mm, excessive vertical growth of the maxilla may be a factor, and orthognathic

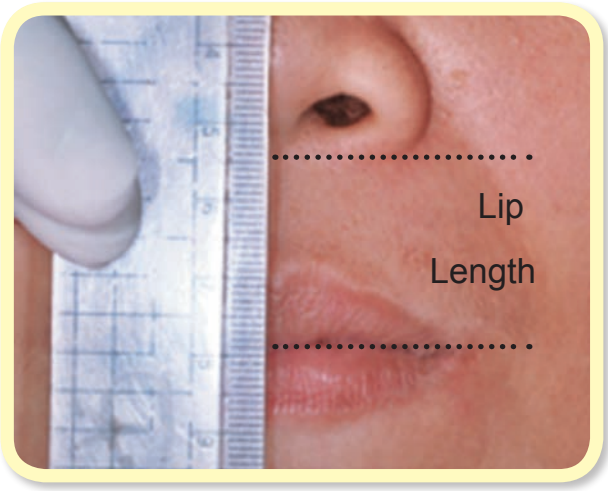



*Fig. 18:*
*The length of the upper lip is measured from subnasale (Sn), which is intersected by the upper dotted line, to the inferior border of the lip (lower dotted line). See text for details.*

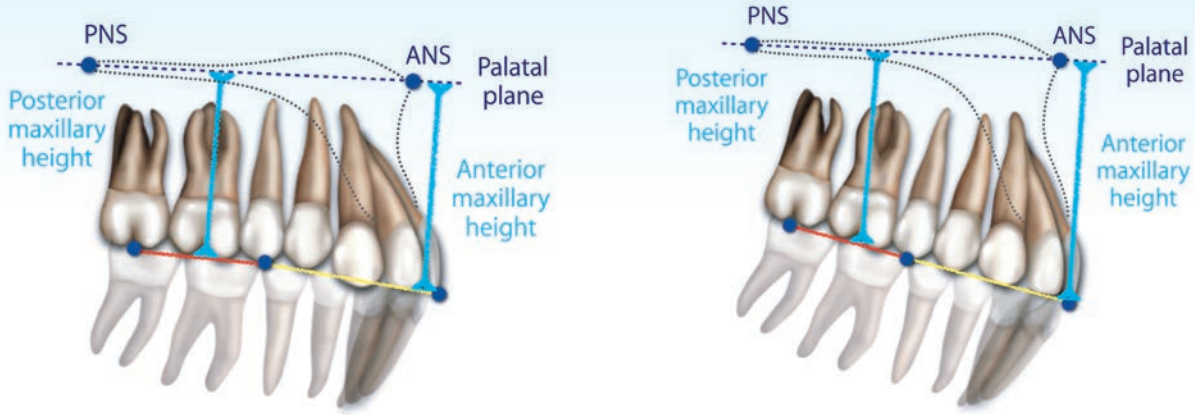



*Fig. 19*:
*The occlusal plane in the sagittal dimension is constructed according to the anterior and posterior maxillary heights as shown. A normal occlusal plane (left) is compared to a steepened occlusal plane (right) that is associated with vertical maxillary excess (VME). See text for details.*

surgery (*LeFort 1 osteotomy*) is indicated. If the lips are competent, but incisal display is more than 4-mm when smiling, the hypermobile lip elevation may require botulinum toxin injection or lip repositioning.[15,16]

4. **Anterior dentoalveolar extrusion (*ADE*)**: Exceeding the average anterior maxillary height of 29.7-mm,[8] is deemed anterior dentoalveolar extrusion. This condition may be associated with anterior tooth wear or a deep bite (*Fig. 19*). The latter is usually associated with an occlusal disharmony between the anterior and posterior segments.[17] Maxillary anterior teeth can be intruded with anterior miniscrew anchorage.[8]

5. **Vertical maxillary excess (*VME*)**: Inferior positioning of the maxilla was associated with clockwise rotation of the upper jaw, and an increase in lower facial height (*Fig. 5, Table 1*). A visual diagnosis of VME is made when the lower third of the face is excessive.[5] Cephalometric analysis is indicated to quantify the problem (*Table 1*). Linear measurements can be made directly on cephalometric radiographs but the magnification of the images must be controlled. The average anterior maxillary height is 29.7-mm,[8] whereas the average posterior maxillary height is 20.6-mm.[18] The current patient's anterior and posterior maxillary heights were 29-mm and 19-mm respectively, so she did not qualify as either an ADE or VME type.

Relative cephalometric measures may be more sensitive for detecting skeletal discrepancies contributing to excessive gingival exposure.

The current patient was severely convex, 28° compared to a norm of 13°, and her lower facial height was 57.8% compared to the norm of 53% (*Table 1*). Relative values are useful for the facial assessment of all patients, but they are particularly sensitive for detecting skeletal patterns favoring a gummy smile.

VME is often treated with orthognathic surgery. A LeFort I procedure down-fractures the maxilla, allowing for segmentalization and three-dimensional repositioning of the dento-alveolar complex. Most patients who undergo this procedure require hospitalization and a substantial recovery period. Post-operative complications may include significant swelling, edema, bruising, and physical discomfort (*pain*).[19] For some patients with VME, a multidisciplinary approach is indicated: orthodontics, orthognathic surgery, periodontics and restorative dentistry.[1] Some authors propose surgical correction of hypermobile and/or short upper lips,[10,20-22] but most procedures involve increasing the depth of the vestibule. Increasing the depth of the fold may involve stripping the attachment of some elevator muscles, and is often indicated for dental alveolar anomalies.[23] Partial re-sectioning of the levator labii superioris muscle may be helpful.[20] However, the stability of this surgical procedure beyond 8 months[21] is unknown. Minimally invasive surgical procedures are advocated for moderate VME and hypermobile upper lip.[23] A mucosal coronally positioned flap reduces gingival display by shortening the vestibular depth.[23]

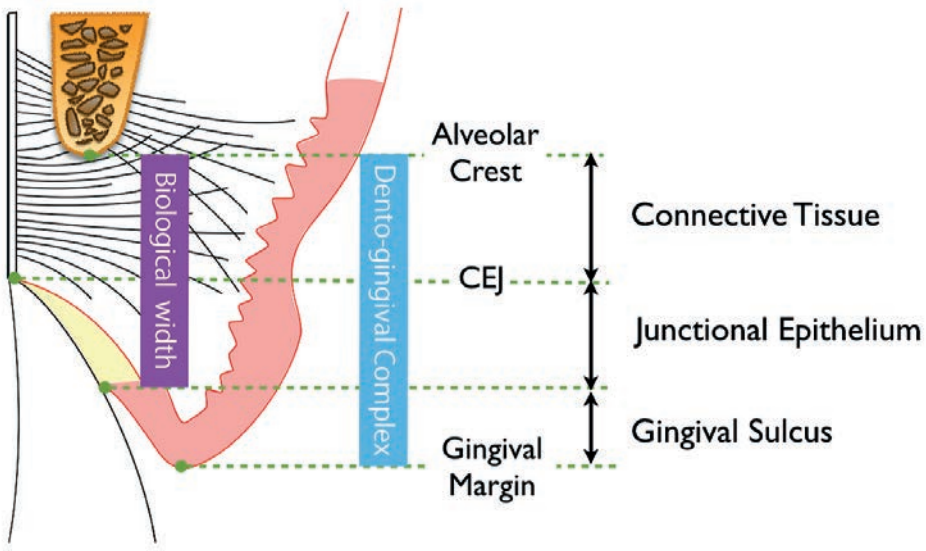
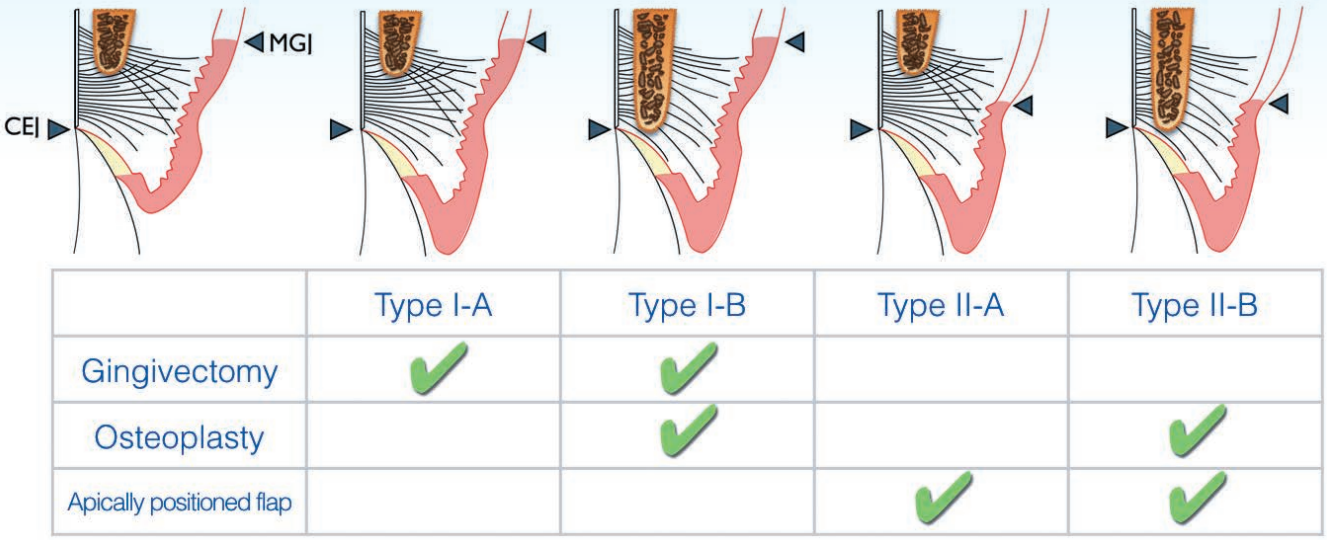



*Fig. 20:*
*The thickness or width of the dentogingival complex is measured clinically by sounding to bone with a periodontal probe. The vertical dimension of a normal dentogingival complex from the gingival margin to bone is approximately 3.0-mm on the buccal and lingual surface, but increases to 4.5~5.0-mm interproximally.*




| | Type I-A | Type I-B | Type II-A | Type II-B |
|---|---|---|---|---|
| Gingivectomy | ✔ | ✔ | | |
| Osteoplasty | | ✔ | | ✔ |
| Apically positioned flap | | | ✔ | ✔ |

*Fig. 21:*
*It is important to note the relationship of the bone height and mucogingival junction (MGJ) to the cementoenamel junction (CEJ). In general, increased pocket depth with a normal attachment at the CEJ, and adequate gingival width as defined by the MGJ, can be treated with a gingivectomy (Type I-A and I-B). A decreased band of attached gingiva is best treated with an apically positioned flap (Type II-A and II-B). If the bone height encroaches on the epithelial attachment (Type I-B and II-B), a 2-mm zone is established (Fig. 12e) for soft tissue attachment to avoid the inflammation associated with a biologic width violation.*

- **Intra-Oral Component**

1. **Gingival enlargement**: Hypertrophic gingival tissues may be due to chronic inflammation, infection or medication (*e.g. phenytoin, cyclosporine, calcium channel blockers*). The treatment for this condition should focus on oral hygiene, but a gingivectomy may be indicated.[17]

2. **Clinical crown length**: The average crown length for an upper central incisor is 11-mm.

3. **Altered passive eruption**: Tooth eruption is divided into two phases: active and passive. Active eruption is the movement of the teeth in the direction of the occlusal plane, whereas passive eruption is the exposure of the teeth by apical migration of the gingiva.[24] Before a crown-lengthening surgical procedure, a careful evaluation of biologic width and other factors of the dento-gingival complex is indicated (*Fig. 20*).[1] Depending on the level of the mucogingival junction (*MGJ*) and alveolar bone crest, there are four types of altered passive eruption: Type I A, type I B, type II A and type II B (*Fig. 21*).[9] Type I and II are distinguished by the width of the keratinized gingiva (*soft tissue*). Subtype A and B refers the level of alveolar bone crest. Bone sounding revealed the current patient was type I B (*gingival width was WNL, but bone height was elevated*), which is best treated with flap exposure and osteoplasty.


*Fig. 22:*
*Pre- and post-treatment images show the patient smiling and at rest (lips closed). The asymmetric gummy smile has been corrected.*

4. **Incisal wear**: A discrepancy in gingival levels may reflect excessive incisal wear (*attrition*) of one or more teeth. Orthodontic correction focuses on leveling the gingival margins in preparation for restoration of the teeth, as needed.

5. **Crown-root ratio**: If the root is supported by adequate alveolar bone, crown lengthening can be performed without orthodontic intrusion.

## • Treatment

Gummy smile of skeletal origin usually requires orthognathic surgery for correction, but a dental origin such as extrusion of the maxillary incisors can be corrected with intrusion mechanics. The dentogingival type of gummy smile is related to abnormal dental eruption or lack of normal gingival recession, and requires lengthening of the anatomic crown. The neuromuscular type of gummy smile is caused by excessive contraction of the lip elevator muscles and can be improved temporarily by injecting botulinum toxin type A.

The lips of the current patient were incompetent as demonstrated by hypermentalis activity, (*Figs. 1 and 5*) so it was important to control the VDO. The use of maxillary anterior miniscrews as proposed by Lin et al.,[25] supplemented with IZC bone screw anchorage (*Fig. 10*), was successful (*Fig. 22*).

The IZC bone screws resisted heavy orthodontic forces for over 10 months, and remained stable. In the absence of definitive studies, the center of resistance ($C_R$) for the maxillary arch was presumed to be near the apices of the premolars (*Fig. 10*). Billiet et al.[26] used double exposure holography to evaluate headgear force applied to skulls, but they were unable to distinguish the $C_R$ for the dentition, from that for the entire nasomaxillary complex. The $C_R$ for rotation of the lower arch with mandibular buccal screw (*MBS*) anchorage is an axis through the midroot area of the canines bilaterally, as determined with finite element analysis (*FEA*).[27] It is important that similar studies be performed to determine the $C_R$ for bilateral IZC anchorage in the maxillary arch. Estimating arch rotation in 2D, relative to the line of force from an IZC bone screw, is unreliable unless the $C_R$ of the arch is known.[27]

As documented in the cephalometric superimpositions, there was a clockwise rotation of the anterior portion of the maxilla. This response is consistent with a line of force anchored by a IZC bone screw, that is inferior to the $C_R$ for the maxillary dentition (*Fig. 10*). However, the maxillary retraction and rotation (*Fig. 17*) suggests the $C_R$ for the upper dentition is more anterior than previously estimated (*Fig. 10*), which is consistent with MBS bone screw anchorage in the mandible.[27] An

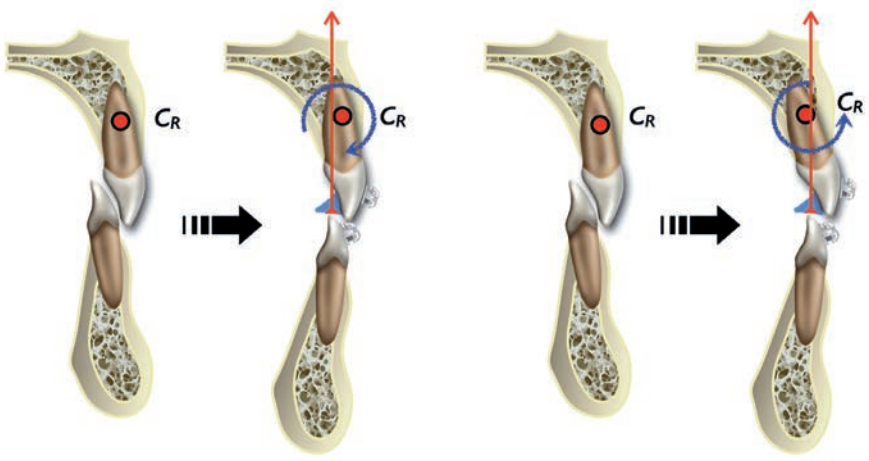



*Fig. 23:*

***Left two drawings**: An anterior BT is bonded on the palatal surface of a lingually inclined maxillary incisor. The line of force from occlusion is lingual to the center of resistance ($C_R$) of the incisor (red dot) which tends to rotate the incisor (blue circular arrow) palatally.*

***Right two drawings**: If the axial inclination of the maxillary incisor is corrected before the BT is attached, the line of occlusal force is labial to the $C_R$ tending to increase the axial inclination of the incisor (blue circular arrow). See text for details.*

accurate $C_R$ for retracting the maxillary dentition with IZC anchorage would be very helpful for advanced treatment planning strategies to improve the scope of treatment and stability.

### Anterior Bite-turbos

Anterior bite-turbos (*BTs*) are excellent tools for deepbite correction when bite opening and posterior rotation of the mandibular are acceptable. They are easy for efficient correction of deepbite. However, severe lingual tipping of maxillary incisors presents a unique problem in biomechanics. BTs generate an axial force on the upper central incisors that tends to increase their clockwise rotation relative to the maxilla.[28,29] When anterior BTs are bonded on maxillary canines (*Fig. 7*), the moment arm on the vertical force is increased. So it was important to focus on correcting the axial inclinations of the upper central incisors early in treatment, so that the BTs could be moved to their lingual surfaces to produce an occlusal force that is anterior to the $C_R$ (*Fig. 23*).

## Conclusions

Excess gingival display (*gummy smile*) is a major esthetic concern for many patients. It is often a very complex problem. An effective strategy is to reverse the apparent etiology of the problem with specific mechanics, that are anchored with bone screws.

## Acknowledgments

Thanks to Dr. Chris Lin, Ms. Yun-Ju Tsa, Mr. Li-Heng Chen and Ms. Li-Xin Chen for helping with data collection.

## References

1. Garber DA, Salama MA. The aesthetic smile: diagnosis and treatment. Periodontol 2000 1996;11:18-28.
2. Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent 1984;51:24-8.
3. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. J Esthet Dent 1999;11:311-24.
4. Kokich VO Jr, Kokich VG, Kiyak HA. Perceptions of dental professionals and laypersons to altered dental esthetics: asymmetric and symmetric situations. Am J Orthod Dentofacial Orthop 2006;130:141-51.
5. Robbins JW. Differential diagnosis and treatment of excess gingival display. Pract Periodontics Aesthet Dent 1999;11:265-72; quiz 73.
6. Burstone CR. Deep overbite correction by intrusion. Am J Orthod 1977;72:1-22.
7. Redlich M, Mazor Z, Brezniak N. Severe high Angle Class II Division 1 malocclusion with vertical maxillary excess and gummy smile: a case report. Am J Orthod Dentofacial Orthop 1999;116:317-20.
8. Peck S, Peck L, Kataja M. The gingival smile line. Angle Orthod 1992;62:91-100; discussion 01-2.
9. Ezquerra F, Berrazueta MJ, Ruiz-Capillas A, Arregui JS. New approach to the gummy smile. Plast Reconstr Surg 1999;104:1143-50; discussion 51-2.
10. Silberberg N, Goldstein M, Smidt A. Excessive gingival display-etiology, diagnosis, and treatment modalities. Quintessence Int 2009;40:809-18.
11. Jorgensen MG, Nowzari H. Aesthetic crown lengthening. Periodontol 2001;27:45-58.
12. Ravon NA, Handelsman M, Levine D. Multidisciplinary care: periodontal aspects to treatment planning the anterior esthetic zone. J Calif Dent Assoc 2008;36:575-84.
13. Levine RA, McGuire M. The diagnosis and treatment of the gummy smile. Compend Contin Educ Dent 1997;18:757-62, 64; quiz 66.
14. Kao RT, Dault S, Frangadakis K, Salehieh JJ. Esthetic crown lengthening: appropriate diagnosis for achieving gingival balance. J Calif Dent Assoc 2008;36:187-91.
15. Polo M. Botulinum toxin type A (Botox) for the neuromuscular correction of excessive gingival display on smiling (gummy smile). Am J Orthod Dentofacial Orthop 2008;133:195-203.
16. Rao AG, Koganti VP, Prabhakar AK, Soni S. Modified lip

repositioning: A surgical approach to treat the gummy smile. J Indian Soc Periodontol 2015;19:356-9.

17. Yeh HY, Chang CH, Roberts WE. Implant-orthodontic combined treatment for gummy smile with multiple missing teeth. Int J Ortho Implantol 2013;32:16-32.
18. Janson GR, Metaxas A, Woodside DG. Variation in maxillary and mandibular molar and incisor vertical dimension in 12-year-old subjects with excess, normal, and short lower anterior face height. Am J Orthod Dentofacial Orthop 1994;106:409-18.
19. Kim SG, Park SS. Incidence of complications and problems related to orthognathic surgery. J Oral Maxillofac Surg 2007;65:2438-44.
20. Miskinyar SA. A new method for correcting a gummy smile. Plast Reconstr Surg 1983;72:397-400.
21. Rosenblatt A, Simon Z. Lip repositioning for reduction of excessive gingival display: a clinical report. Int J Periodontics Restorative Dent 2006;26:433-7.
22. Litton C, Fournier P. Simple surgical correction of the gummy smile. Plast Reconstr Surg 1979;63:372-3.
23. Humayun N, Kolhatkar S, Souiyas J, Bhola M. Mucosal coronally positioned flap for the management of excessive gingival display in the presence of hypermobility of the upper lip and vertical maxillary excess: a case report. J Periodontol 2010;81:1858-63.
24. Morrow LA, Robbins JW, Jones DL, Wilson NH. Clinical crown length changes from age 12-19 years: a longitudinal study. J Dent 2000;28:469-73.
25. Lin JC, Liou EJ, Bowman SJ. Simultaneous reduction in vertical dimension and gummy smile using miniscrew anchorage. J Clin Orthod 2010;44:157-70.
26. Billiet T, de Pauw G, Dermaut L. Location of the centre of resistance of the upper dentition and the nasomaxillary complex. An experimental study. Eur J Orthod 2001;23:263-73.
27. Roberts WE, Viecilli RF, Chang C, Katona TR, Paydar NH. Biology of biomechanics: finite element analysis of a statically determinate system to rotate the occlusal plane for correction of skeletal Class III malocclusion. Am J Orthod Dentofac Orthop 2015;148:943-955.
28. Tavarungkul R. Correcting deepbite with fixed bite ramps. News & Trends in Orthodontics 2009 Oct;16:68-71.
29. Su SPW, Yeh HY, Chang CH, Roberts WE. Crowded Class II division 2 malocclusion with Class I molars due to blocked in lower second premolars. Int J Ortho Implantol 2014;35:65-78.

# Discrepancy Index Worksheet

**TOTAL D.I. SCORE** 27

## OVERJET

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

## OCCLUSION

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

Total = 4

## LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

## BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

## CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

Each degree > 6° _____ x 1 pt. = 4

SN-MP

≥ 38° = 2 pts.

Each degree > 38° _____ x 2 pts. = 2

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 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

## 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) =_

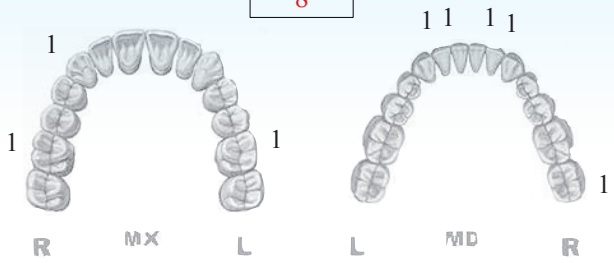
Total = 0

# Cast-Radiograph Evaluation

**Total Score:** 24

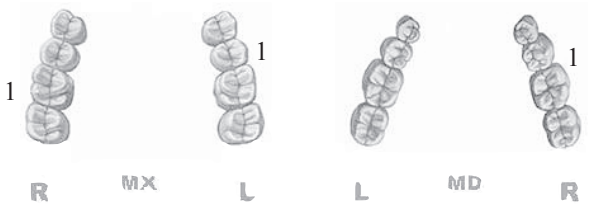
## Alignment/Rotations

8



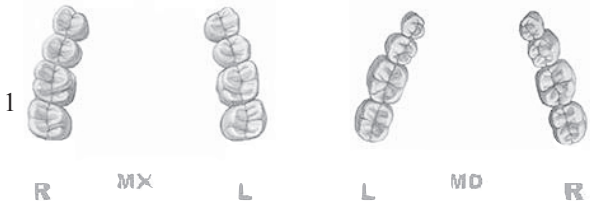

## Marginal Ridges

3




## Buccolingual Inclination

1

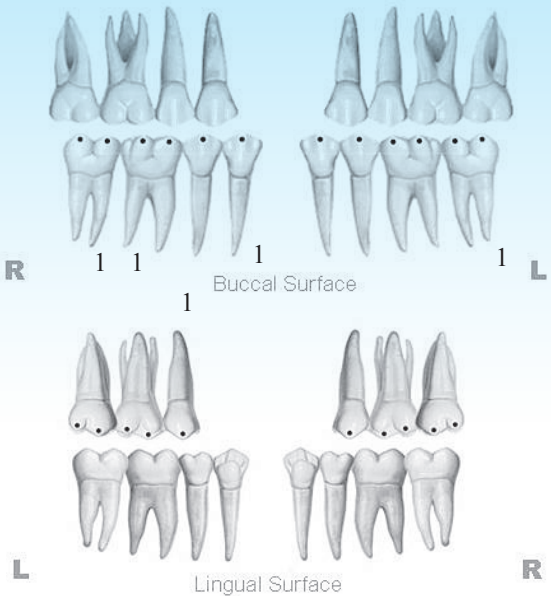



## Overjet

0

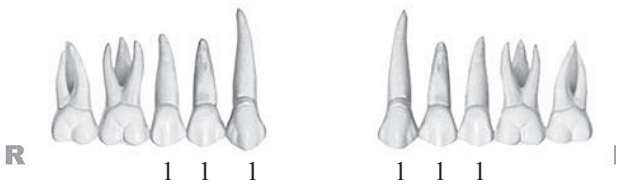

## Occlusal Contacts

4



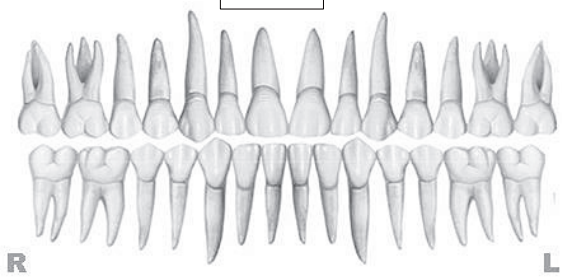

## Occlusal Relationships

6



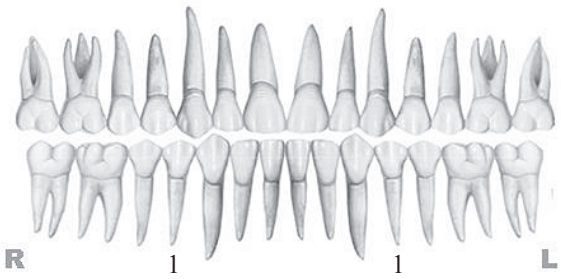

## Interproximal Contacts

0




## Root Angulation

2



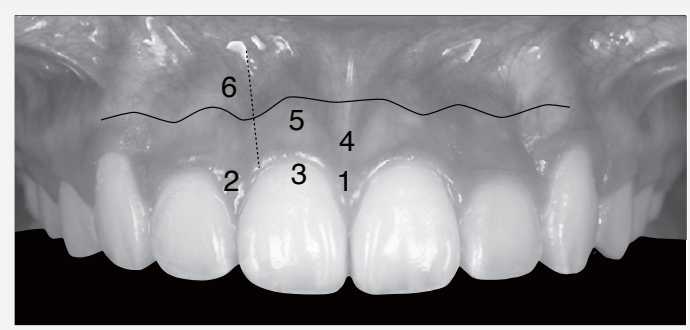

***INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.***

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

**Total Score: =** 3

## 1. Pink Esthetic Score

Total = 1

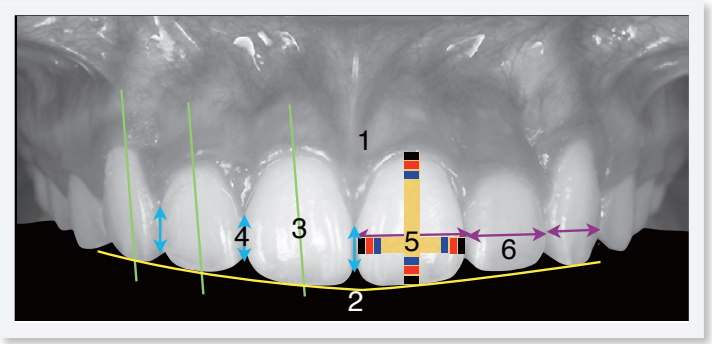



| | | | |
|---|---|---|---|
| 1. M & D Papilla | 0 | 1 | 2 |
| 2. Keratinized Gingiva | 0 | 1 | 2 |
| 3. Curvature of Gingival Margin | 0 | 1 | 2 |
| 4. Level of Gingival Margin | 0 | 1 | 2 |
| 5. Root Convexity ( Torque ) | 0 | 1 | 2 |
| 6. Scar Formation | 0 | 1 | 2 |

| | | | |
|---|---|---|---|
| 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 = 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 |

| | | | |
|---|---|---|---|
| 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 |

Herman Ostrow School of Dentistry of USC

*Continuing Professional Education*

USC University of Southern California

# USC Comprehensive Surgical and Restorative Implant Training Program in Taiwan

# 南加大植牙專科進修課程

# 2017

7/29~31, 2017 ( 六，一 - 演講與實作 workshop)
11/4~6, 2017 ( 六，一 - 演講與實作 workshop)
1/24, 2018 ( 三 - 美國可選修的 cadaver workshop)
1/26~27, 2018 ( 五，六 - 美國演講，畢業典禮 )

9/16~18, 2017 ( 六，一 - 演講與實作 workshop)
1/22~23, 2018 ( 一 ，二 - 美國演講 )
1/25, 2018 ( 四 - 美國可選修的 cadaver workshop)
1/28, 2018 ( 日 - 美國可選修的 cadaver workshop)

地點：
金牛頓藝術科技中心：新竹市建中一路 25 號 2 樓 (2016 年 7 月到 11 月 )
Millennium Biltmore Hotel Los Angeles. 506 South Grand Avenue. Los Angeles, CA 90071-2607 (2017年2月)

## 講員陣容









Alexandre-Amir Aalam | Neema Bakhshalian | Lyndon Cooper | Fereidoun Daftary | Thomas Han





Bach Le | Pascal Magne | Baldwin Marchack | Seiko Min | Alireza Moshaverinia



Ilan Rotstein | Tomaso Vercellotti | Homayoun Zadeh







# 貝多芬牙醫視訊 百科全書

## 矯正研習

由矯正名師張慧男醫師深入淺出的生動教學，讓您在循序漸進的主題課程裡，完全掌握結合最新的矯正系統Damon以及矯正骨釘OBS的實用治療秘訣。無論是矯正新手或是想要持續進修的專科醫師都不可錯過！

- 矯正基礎 Damon Q
- 矯正進階 Advanced
- 矯正植體 OrthoBoneScrew
- 矯正精修 Finishing（七年度）
- 中文精選 C-Lecture

## 診間應用

還不知如何利用科技行銷與提昇專業服務？透過系統化的助理訓練課程，囊括「矯正」、「植牙」、「兒童牙科」結合三領域的案例解說和衛教示範，讓您輕鬆運用iPad科技專業化您的診間服務！

- 矯正 E-Ortho
- 兒牙 E-Pedo
- 植牙 E-Implant
- 助理訓練 Assistant

## 植牙精進

由矯正名師張慧男醫師主持，邀集國內外植牙講師，整理當前植牙的熱門主題，透過66堂課的專題演講和個案分析，讓您在植牙學習之路上不斷精進！

- 植牙論壇 Implant Forum（六年度）

終身會員 享好康

凡購買任一系列貝多芬視訊課程，皆可享有以下優惠

1. **免費更新** E-Consultation、Damon Q、Advanced、OrthoBoneScrew。
2. **無聲升有聲:** 凡單購無聲視訊課程，只需付些微差額，即可升級最新有聲課程。
3. 贈送矯正植牙國際電子期刊（IJOI）
4. iOS 系統健檢

Newton's A (03)-573-5676 http://orthobonescrew.com 新竹市建中一路25號2樓

Kerr™

活動期間：自 **2017/1/1 - 3/25** 止

## 補牙用流動性樹脂 / 補牙樹脂


(定價NT$2,200/2g/2支/包)


(定價NT$1,500/2g/支)


(定價NT$1,300/2g/支)

(定價NT$1,100/2g/盒)

(定價NT$2,100/2g/2盒/包)


(定價NT$1,800/4g/支)


(定價NT$1,800/4g/支)

**任選補牙樹脂類**
**定價購買　滿6萬**
**送 無線LED光聚機**
***Demi Plus 或 Demi Ultra 1 台***
(定價NT$50,000/台)　(定價NT$55,000/台)

· 衛署醫器輸字第022220號 · 衛署醫器輸字第022166號 · 衛部醫器輸字第028594號 · 衛署醫器輸字第011616號 · 衛署醫器輸字第023384號 · 衛部醫器陸輸字第000752號

## 加成型矽膠印模材

買 **Take 1 Advanced** Cartridge Wash (50mlx24) 一箱+
**Take 1 Advanced** Volume (380mlx2) 五盒　(定價NT$78,200/組)

特價 **NT$68,000**/組


1箱

+


5盒

再贈 Volume Mixer 一台
(定價NT$62,000/台)

· 衛署醫器輸字第021479號 · 衛署醫器輸壹字第009056號

## Bonding黏著劑

任選 OptiBond All-In-One(6ml) 或 OptiBond S(6ml) 10瓶
(定價NT$3,800/瓶)　(定價NT$2,900/瓶)

三合一自酸蝕黏著劑/二合一全酸蝕黏著劑

特價 **NT$10,000**/組


任選10瓶

· 衛署醫器輸字第018552號、010932號


6盒

## 後牙用高流動性奈米樹脂

***SonicFill Unidose Refill 6 盒*** (定價NT$31,800/6盒)
***Kerr Multiflex Coupling 460E 1 個*** (定價NT$8,800/個)
***SonicFill Handpiece 1 支*** (定價NT$38,500/支)

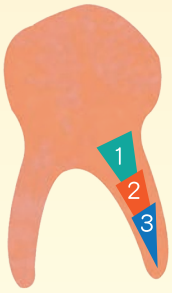
特價 **NT$39,999**/組

· 衛署醫器輸字第024064號 · 衛部醫器輸壹字第013931號

Kerr ENDODONTICS

# ACE Technique Package

Dr. Alex Chan




*A technique that raises patient safety, improves performance & increase cost efficiency for your endodontic treatment*

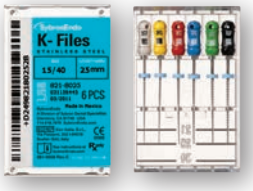
**Step1 Canal Negotiation + Glide Path**
M4 Handpiece
Hand Files #10, #15, #20, #25

**Step2 Canal Shaping**
Small,Tight canal：TFA(SM2 .06#25) to WL.
Medium canal：TFA(ML1 .08 #25) to WL.

**Step3 Apical Finishing**
Apical gauge with K-File
Finish with corresponding 'Apical File'
eg. K3XF .04 #30 / #35 / #40

*Elements Motor+8:1Handpiece 1組*
(定價NT$150,000/組)

+




*K-file 20 盒(size任選)*
(定價NT$7,600-8,400/20盒)

+

*M4 Safety Handpiece 1支*
(定價NT$33,000/支)


*K3XF Files 10 盒(size任選)*
(定價NT$24,000/10盒)

+


*TFA Files 20 盒(size任選)*
(定價NT$70,000/20盒)

+


*K3 GP 5 盒*
(定價NT$3,750/5盒)

~~(定價NT$288,350-289,150/套)~~

**特價 NT$150,000 /套**

・衛部醫器輸壹字第014069號・衛部醫器輸壹字第013962號・衛署醫器輸壹字第009148號・衛署醫器輸壹字第010742號

## Obturation System
## elementsfree Package

*GP Cartridge 10 盒*
*(23, 25 Gauge任選)*
(定價NT$42,000/10盒)

+

*Pulp Canal Sealer EWT1 盒*
(定價NT$5,800/盒)

+

*Elementsfree 1 台*
(定價NT$205,000/台)

~~(定價NT$252,800/1組)~~

**特價 NT$129,999 /套**

・衛部醫器輸壹字第016766號・衛部醫器輸壹字第015275號・衛署醫器輸字第011611號

總代理 湧傑 YONG CHIEH 訂購專線：北區 (02)2778-8315・中區 (04)2305-8915・南區 (07)226-0030

# Archwire Sequence for a Passive Self-Ligating Lingual Bracket System with an 0.018-in Square Slot


## Abstract

*Archwire sequencing is the key to efficient treatment with an advanced lingual bracket system. To ensure patient comfort, maximize the potential for each phase of treatment, and progress to the final archwire as soon as possible, clinicians must carefully sequence the mechanics in a specific order. There are four stages for comprehensive orthodontic treatment: (I) alignment and leveling, (II) torque control, (III) space closure, and (IV) finishing. This article presents a simplified rationale for efficient sequencing of the specific archwires that are required for each stage of treatment. (Int J Orthod Implantol 2017;45:86-90)*



***Key words:***
*Alias® lingual appliance, passive self-ligating, square slot, archwire sequencing*


## Introduction

Alias® (*Ormco, Glendora, CA*) is the first passive self-ligating (*PSL*) lingual bracket with a square slot. The device was invented and developed by Drs. Kyoto Takemoto and Giuseppe Scuzzo.[1] The self-ligating slide on the bracket facilitates archwire changes and simplifies the application of mechanics. The 0.018x0.018-in square slot with a PSL mechanism is designed for a straight-wire technique, that improves rotational and torque control for achieving more efficient alignment. A low profile bracket with rounded contours enhances patient comfort and improves clinical performance. The small size of the brackets provide a superior fit for accurate placement. Simplicity, efficiency, and comfort are unique benefits of the Alias® lingual system (*Fig. 1*).[1-5] However, clinicians must carefully utilize a progressive archwire sequence that is specifically designed for the appliance to optimize the treatment response.[6]

## Stage I: Alignment and Leveling

The objective of the first stage of treatment is to gently level and align both arches with resilient archwires that have specific material properties: low load-deflection relationship, resistance to fatigue fracture, and inherent material strength (*toughness*). The initial leveling and alignment requirements are achieved with an

**Dr. Angle Lee,**
*Editor, International Journal of Orthodontics & Implantology (Left)*

**Dr. Kyoto Takemoto,**
*Inventor, E-Line Orthodontic Clinic in Tokyo, Japan (Center)*

**Dr. Giuseppe Scuzzo,**
*Inventor, E-Line Orthodontic Clinic in Rome, Italy (Rigth)*

**Dr. Chris Chang,**
*Founder, Beethoven Orthodontic Center*
*Publisher, International Journal of Orthodontics & Implantology (Left)*

**Dr. W. Eugene Roberts,**
*Editor-in-chief, International Journal of Orthodontics & Implantology (Right)*

0.013-in copper-nickel-titanium (*CuNiTi*) archwire (*Fig. 2*). The small dimension of the 0.013-in round archwire in an 0.018x0.018-in slot minimizes friction and binding of the archwire within the lumen (*tube*) of the engaged PSL bracket. The brackets are free to slide along the wire as the teeth are leveled and aligned. Light force, resilient round archwires in free-sliding tubes are designed to minimize necrosis (*hyalinization*) of the periodontal ligament (*PDL*).[7-8] Schwarz[9] proposed that PDL pressure (*stress*) exceeding capillary pressure (*~16kPa*) produced hyalinization, but more recent biomechanics studies utilizing finite element modeling have demonstrated that irreversible cell damage and necrosis occurs at a much lower levels of PDL stress (*~8-10KPa*).[10-11] PDL necrosis decreases the rate of tooth movement and is also associated with expression of external apical root resorption (*EARR*).[10-13] It is particularly important to minimize applied force during the tooth tipping mechanics of initial alignment to avoid apical necrotic sites, that may be expressed as EARR in susceptible patients.[12] Furthermore, very low levels of force (*~56cN*) enhance the rate of premolar translation with sliding wire mechanics[14] and minimize EARR.[10-13]

Once optimal initial alignment is achieved, an 0.016-in CuNiTi archwire is used for additional alignment and leveling of the arch. This progression of highly resilient archwires with low force to deflection

*Fig. 1:*
*An 0.018x0.018-in slot PSL bracket has minimal play between the slot and the archwire, so the bracket must be precisely positioned on each tooth to achieve proper alignment of the arch with a straight archwire.*

rates is to minimize PDL necrosis relative to tooth tipping during initial alignment. The purpose of the 0.013-in and 0.016-in CuNiTi wires is to achieve the provisional alignment necessary to receive the subsequent archwire, but not to resolve all of the rotations.

## Stage II: Torque Control

The objective of the second stage of treatment is complete rotations and establish torque control with an 0.016x0.016-in CuNiTi wire (*Fig. 3*). The archwire must be inserted with minimal active engagement; otherwise, the arch is not ready for stage II, and additional round wire alignment is indicated. To enhance esthetics during active treatment, spaces are closed between the six anterior teeth with elastic ligature. Then an 0.018x0.018-in CuNiTi wire is inserted to complete torque control and prepare the arches for the insertion of the 0.018x0.018-in stainless steel (*SS*) archwire. At the end of Stage II, all alignment, leveling, and torque control are completed.

## Stage III: Space Closure

The third stage is dedicated to closure of extraction spaces, as needed. For optimal esthetics, en-masse retraction of the anterior segments is indicated. An 0.0175x0.0175-in titanium-molybdenum alloy (*TMA*) wire is used for loop-activation space closure (*Fig. 4*). For sliding mechanics, a straight 0.018x0.018-in stainless steel (*SS*) archwire is preferred (*Fig. 5*) to take advantage of the minimal friction and simplified mechanics associated with PSL brackets.

For maximum anchorage, miniscrews are superior to headgear or other appliances that require patient compliance (*Fig. 5*). Moreover, vertical and transverse bowing effects of the archwire are unlikely with

*Fig. 2:*
*An 0.013-in CuNiTi archwire is used to initiate tooth movement. The terminal ends of the archwire are horizontally cinched back to avoid soft tissue irritation.*

*Fig. 3:*
*An 0.016x0.016-in CuNiTi wire is used in stage II to initiate torque control, and the ends of the archwire are cut flush with the molar tubes.*

| Alias Archwire Sequencing | | | |
|---|---|---|---|
| I | Alignment & Leveling | 0.0**13**<br>0.0**16** | CuNiTi<br>CuNiTi |
| II | Torque Control | 0.0**16**x0.0**16**<br>0.0**18**x0.0**18** | CuNiTi<br>CuNiTi |
| III | Space Closure | 0.0**18**x0.0**18**<br>0.0**175**x0.0**175** | SS<br>TMA |
| IV | Finishing | 0.0**175**x0.0**175** | TMA |

Table 1: Summary of the archwire sequence for the Alias® lingual bracket system

*Fig. 4:*
*An 0.0175 x0.0175-in TMA wire is used for loop-activation mechanics to close extraction space. Two stops are crimped at the distal base of the L-loops to activate space closure (blue arrows). For en-masse retraction of the anterior segment, the L-loops are activated bilaterally with SS ligatures tied back to the miniscrews.*

*Fig. 5:*
*An 0.018x0.018-in SS wire is used for sliding mechanics to close space. The anterior segment is ligated from canine to canine with an 0.008-in SS ligature. Miniscrews are inserted mesial to the first molars to provide anchorage for en-masse retraction. Power chains are stretched between the miniscrews and power arms to deliver 150g (cN) of force bilaterally to retract the anterior segment. As illustrated, one power arm is ideally positioned (yellow arrow) but the other power arm (green arrow) is too distal.*

miniscrew anchorage, because accentuated anchorage bends are unnecessary.

## Stage IV: Finishing

The objective of the fourth (*finishing*) stage is final detailing with an 0.0175x0.0175-in TMA archwire. The flexible archwire is readily adjusted by the clinician and the gentle forces are relatively comfortable for patients.

## Conclusion

Archwire sequencing for the Alias® lingual appliance system is summarized in Table 1. This innovative esthetic appliance with low profile PSL brackets has transformed lingual treatment into an application of simple, efficient, and comfortable mechanics. The archwire sequence is an effective guide to help clinicians master the new system quickly and confidently.

## Acknowledgment

Thanks to Mr. Paul Head for proofreading this article.

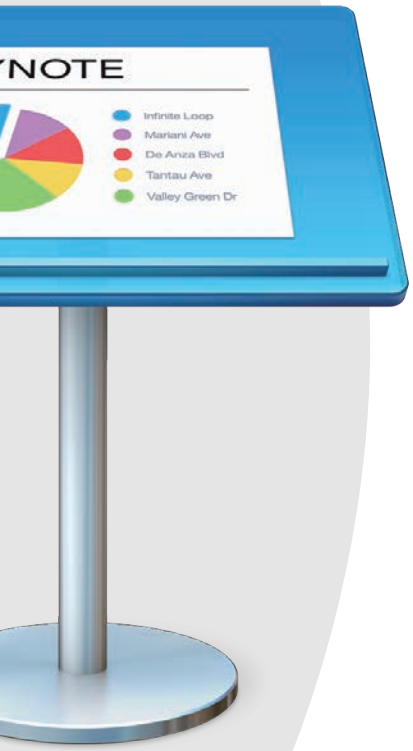
## References

1. Scuzzo G, Takemoto K, Takemoto Y, Scuzzo G, Lombardo L. A new self-ligating lingual bracket with square slots. J Clin Orthod 2011;45(12):682-90.
2. Lombardo L, Saba L, Scuzzo G, Takemoto K, Oteo L, Palma JC, Siciliani G. A new concept of anatomic lingual arch form. Am J Orthod Dentofacial Orthop 2010;138(3):260.
3. Scuzzo G, Takemoto K, Takemoto Y, Takemoto A, Lombardo L. A new lingual straight-wire technique. J Clin Orthod 2010;44(2):114-23.
4. Takemoto K, Scuzzo G. The straight-wire concept in lingual orthodontics. J Clin Orthod 2001;35(1):46-52.
5. Takemoto K, Scuzzo G, Lombardo LU, Takemoto YU. Lingual straight wire method. Int Orthod 2009;7(4):335-53.
6. Takemoto K, Takemoto Y, Takemoto A. Severe open bite and crowding case treated by a new passive self-ligating lingual bracket with square slots. Int J Orthod Implantol 2016;42:108-19.
7. Sandstedt C. Einige Beiträge zur Theorie der Zahnregulierung. Nordisk Tandläkare Tidskrift 1904;5:236-56.
8. Sandstedt C. Einige Beiträge zur Theorie der Zahnregulierung. Nordisk Tandläkare Tidskrift 1905;6:1-25. 141–68.
9. Schwarz AM. Tissue changes incidental to orthodontic tooth movement. Int J Orthod, Oral Surg, and Radiog 1932;18:331-52.
10. Viecilli RF, Katona TR, Chen J, Hartsfield JK, Roberts WE. Orthodontic Mechanotransduction and the Role of the P2X7 Receptor. Am J Orthod Dentofac Orthop 2009;135:694 e1-16; discussion 694-5
11. Viecilli RF, Kar-Kuri MH, Variable J, Budiman A, Janal M. Effects of initial stresses and time on orthodontic external root resorption. J Dent Res 2013;92:346-51.
12. Al-Qawasmi RA, Hartsfield Jr. JK, Everett ET, Flury L, Liu L, Foroud TM, Macri JV, Roberts WE. Genetic predisposition to external root resorption in orthodontic patients: linkage and association of the interleukin 1B gene. Am J Orthodontics and Dentofacial Orthop 123:242-252, 2003.
13. Roberts WE, Viecilli RF, Chang CH, Katona TR, Paydar NH. Biology of biomechanics: finite element analysis of a statically determinate system to rotate the occlusal plane for correction of skeletal Class III malocclusion. Am J Orthod Dentofacial Orthop 2015;148:943-955.
14. Chiu GSC, Chang CH, Roberts WE. Interdisciplinary Treatment for a Compensated Class II Partially Edentulous Malocclusion: Orthodontic Creation of a Posterior Implant Site. Am J Orthod Dentofacial Orthop. 2016 (Submitted).

2017 **全新設計！**

# Keynote Workshop

高效簡報學習法




## K1-2 強化你的 Keynote 簡報力

(四) 11/16

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

講師：金牛頓工程師

## K3 賈伯斯的簡報秘訣與設計要素

(四) 11/23

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

講師：張慧男醫師

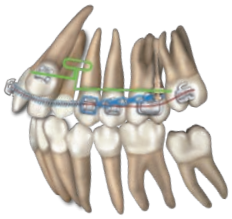
## K456 精修繪圖及動畫技巧

(六～一) 12/2-4

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

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

講師：Dr. Rungsi Thavarungkul



- 報名 2017 K456 課程即贈送 2016 及 2017 課程視訊。
- 名額有限，以繳費順序為依據。
- 舊生享特惠優惠價，限額6名。

若取消報名，30天前退款將扣除10%行政手續費，30天內退款將扣除30%行政手續費。

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


# OrthoBoneScrew Super Set

Created by Dr. Chris Chang, OrthoBoneScrew(OBS) is made of medical grade, stainless steel and is highly praised by doctors for its simplistic design, low failure rate and excellent quality. Beethoven's OBS super set is your must-have secret weapon toprovide a consistent traction force in a minimally invasive approach.

## 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

FDA

ISO 9001 SGS ISO 13485 SGS

Directive 93/42/EEC G.M.P. MEDICAL DEVICE

Made in Taiwan

Screw Type

| | |
|---|---|
| 1.5 | 1.5x8mm |
| 2.0 | 2.0x12mm |
| 2.7 | 2.0x14mm (with holes) |


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


Newton's A +886-3-573-5676 http://orthobonescrew.com info@newtonsa.com.tw

# Products

## Dental Products Essential Kit

### Double Retractors

Double Retractors x2, Black Board x2

The double-end design creates an extended handle and allows for firm grasp. The new and improved material is more durable and resilient. The light shape provides the most esthetic aid in intra-oral photography.

### Stainless Steel Mirror

Size : L (Recommanded), M, S

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.

# In memory of Charles Burstone

## *He has been missing almost two years, but it is still fresh.*

I met Charlie in 1974. I had called the secretary in Connecticut and asked whether I could come and visit and give lecture to the graduate students. The answer was yes, but Dr. Burstone did not have time for me. He would introduce me and then leave for more important obligations. Charlie did not leave the lecture room, but sat down and after the lecture he invited me to dinner. This was the beginning of a friendship that lasted until his death.

I came to Connecticut regularly and always stayed at his home. That gave me a chance to get to know Charlie as a private person. It was not easy. He was always kind, but very protective about his private life. He was, to be frank, not very domestic. His house was wonderful in the midst of a plot with different trees. Once I suggested to invite friends for dinner, I realized that essential things as cutleries and a table cloth had to be purchased. He would invite people out and not at home although his home was beautiful and full of memories from all his travels. When we invited guests, I liked to cook and he enjoyed sharing his knowledge with friends.

*Fig. 1: A view on Florence from Fiesole with Dr. Kraft.*

**Dr. Birte Melsen, DDS**
*Affiliate, Universities of Lexington Kentucky, Perth West Australia and Hannover Germany*

*Fig. 2: Preparing for the five star dinner.*

*Fig. 3:*
*On the street with the beloved Timberland accompanied by Dr. Fotis who also invited Charlie for a vacation on Rhodes.*

Charlie came to Aarhus, Europe the first time together with Dr. Nanda who had just joined the faculty. They gave a typodont course. In comparison with all the other courses I had taken: Tweed, Jarabak, Ricketts, Begg, the segmented approach made sense. I could use the mathematical logic and soon our department was dominated by the Burstone's thoughts and the six Geometries were eagerly discussed. But we shared not only orthodontics, but also philosophy and religion. He came to Italy (*Figures 1-4*) where we gave courses together and where he enjoyed the museums and the mountains. Sometimes he over-estimated himself and my younger son almost had to carry him

*Fig. 4:*
*In Florence with friends: professor Houstone and professor Moss and wife are all no longer with us. Also Professor Prahl and professor Wenzel and Dr Fotis joined us.*

*Fig. 5: Elegant dinner with Coca-Cola.*

home from a mountain in Italy. We attended operas in Europe and US, but argued about whether he could go in the opera in Timberland shoes, eat with a fork only and drink Coca-Cola to the finest menu in a 3 star Michelin restaurant (*Fig. 5*). The appearance did not mean so much, but the discussion on philosophy and history were lively. Charlie was a great company also to my sons and he got a second family when he was on sabbatical in Göttingen in Germany (*Fig. 6*). To me Charlie was a friend and we got closer when we were away from orthodontics. He had no family, after his older brother passed away at a young age and he took good care of his sister-in-law. When she died, Charlie had no family left. The closest thing was the Marcotte family where he enjoyed being Uncle Charlie.

There was a side of Charlie not known by many; most likely due to the respect they had for him, the fear of intimacy. This Charlie knew about the family problems of his housekeeper. He played with the children of his colleagues in Europe. He enjoyed visiting galleries, reading books on history and philosophy, but was also a person who kept people at a distance from his private life although he enjoyed telling funny stories (*Fig. 7*). He was, on the other hand, interested in getting to know other people and once he invited me to visit Sct. Petersburg before the "*opening*" of Russia. He had confidence in people and got cheated when he "*bought*" rubles at a good exchange rate. Rubles that proved to be outdated, but we had a good laugh, and enjoyed the fantastic art and the terrible food.

We passed his last days together in Seoul as an invitation by Dr. Park for combining lecturing and vacation. He had given 3 brilliant lectures in the morning. Following a photo session (*Fig. 8*) we were going for lunch. He said that he was not hungry and did not feel so well so I escorted him to his room which was next to mine. And we agreed on meeting for the dinner organized by our hosts.

*Fig. 6: Charlie as father Christmas in Germany.*

*Fig. 7:*
*Entertaining Professor Subtelny and other colleagues.*

Half an hour before the dinner time there was a noise from his room. He is turning over his suitcase, I thought. His room was a mess. But he didn't answer when I knocked on the door. I called the porter of the guest house where we lived and the door was opened. He was lying on the floor and an attempt to revive him was in vain. Charlie died surrounded by people who loved him and in the midst of what he liked best lecturing on biomechanics. It was sad, but didn't he die the way we all want, to part from this life surrounded by those who care for us?

Let us pay tribute to his memory!


*Fig. 8: The last picture. In Seoul, a few hours before Charlie left us.*

# e-Courses

## A rich learning experience


These are all Dr. Chang' s course slides turned into videos with lots of pictures, videos and clear headings. So it' s very easy to understand when you can see how the procedures are done. It' s much more interesting and practical than reading a textbook. It' s a very easy and efficient way of learning and constantly refreshing your memory.



Available on the App Store

Get

This app is designed for iPad, iPhone and iPad touch

## Series

Voiced — Damon Q

Voiced — Advanced

Voiced — OrthoBoneScrew

Voiced — E-Lecture

Finishing (7 Sessions)

E-Ortho

E-Implant

E-Pedo

Assistant

Note:

1. Most video courses are available in both English and Chinese and are sold separately.
2. Customers who purchase one set of courses will have access to both the narrated and non-narrated version.
3. Some courses, including Damon Q and Advanced, are renewed annually and each renewal is to be purchased separately with a 50% discount.

Newton's A +886-3-573-5676 http://orthobonescrew.com info@newtonsa.com.tw

# BDE

Knowledge in your pocket

Free App

Available on the App Store

This app is designed for iPad, iPhone and iPad touch

Your personal mobile learning device

## Beethoven Dental Encyclopedia

## Damon Q Voiced in English is now available!!

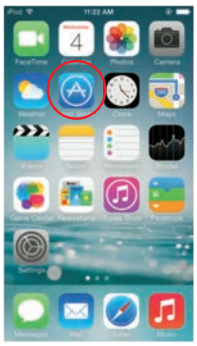
BDE offers professional orthodontic and implant video courses. Members can watch the latest dentistry treatment from the comfort of their home. All courses are instructed by Dr. Chris Chang. This step-by-step practical course will make your learning an informative and fun experience. You can also have access to International Journal of Orthodontics and Implantology from the App.

✔ Online access ✔ Offline download and unlimited viewing

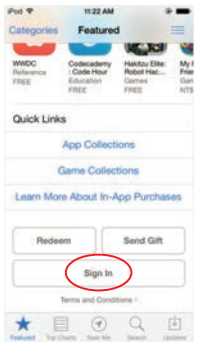
Note:

1. Most video course are available in both English and Chinese and are sold separately.
2. Customers who purchase one set of courses will have access to both the narrated and non-narrated version.
3. Some courses, including Damon Q and Advanced, are renewed annually and each renewal is to be purchased separately with a 50% discount.

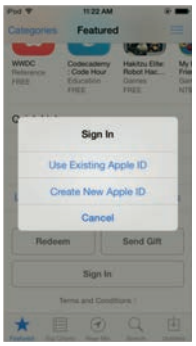
## Step-by-step Instructions



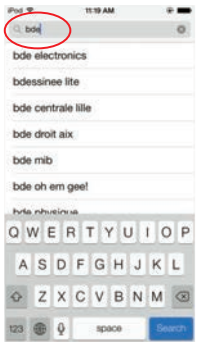
1. Go to App Store on your device.



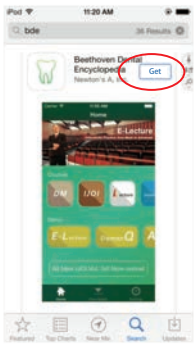

2. "Sign in" with your Apple ID.



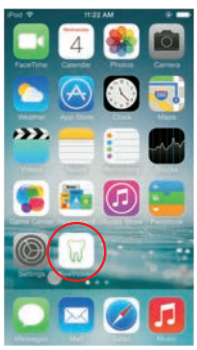

3. "Create Apple ID" if you don't have one.



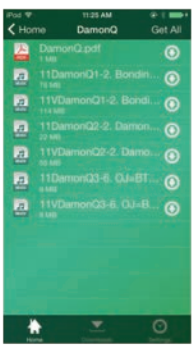

4. Search for "BDE."




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



6. Download completed!


7. Once downloaded, click "BDE" to launch the app.

If you are interested in our paid video ormedical products, contact **app@newtonsa.com.tw** for more information.

+886-3-573-5676

http://orthobonescrew.com

Newton's A

Animation & Illustration Workshop

# Advanced Keynote Workshop


**2017** 12/2-4 (Sat-Mon) 09:00-17:00

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

## Topics:

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

Lecturer:
Dr. Rungsi Thavarungkul,
Thailand

Early Bird

by 2017/10/02

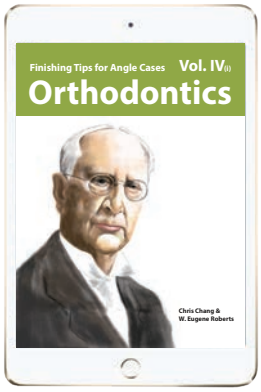
Newton's A course@newtonsa.com.tw

Requirements: Mac computer with OSX 10.11.X; Keynote 6.X (the latest)

# 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

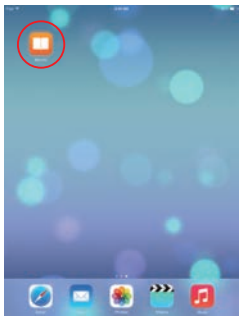
Beethoven Orthodontic and Implant Group has been publishing the International Journal of Orthodontics and Implantology since 2007. This Journal features excellently finished case reports evaluated by objective grading systems. **The Orthodontics and Implant Dentistry eBook series** is a special selection 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:

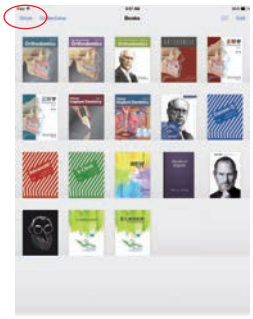
Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg,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

Available on the iBookstore

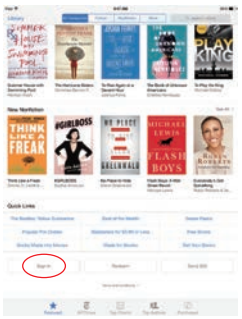
## Step-by-step Instructions



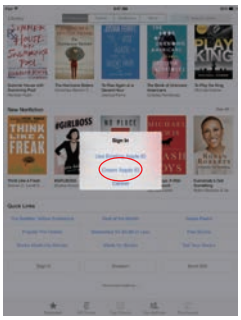
1. Launch "iBooks" app on your iPad.



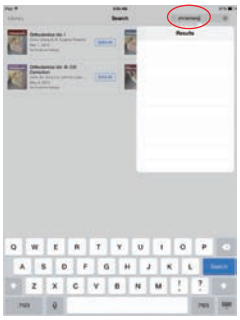
2. Click "Store."



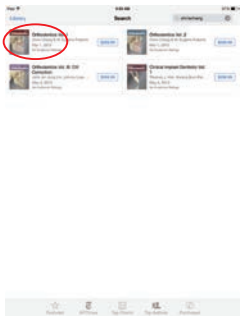
3. "Sign in" with your Apple ID.



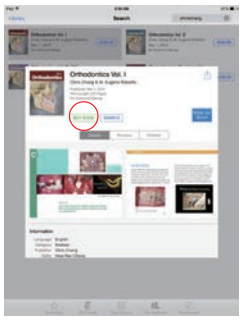
4. "Create Apple ID" if you don't have one.



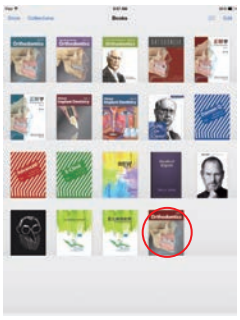
5. Search for "chrischang."



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 **app@newtonsa.com.tw** for more information.

+886-3-573-5676

http://orthobonescrew.com

app@newtonsa.com.tw

Newton's A

# Feedback from the world

The lectures were amazing. Dr. Chang kept everything very simple. The presentations were beautiful, and I learned a lot of things. Everything was well organized. The concepts were very well explained. This is the best course I have attended in 15 years as a dentist.

Congrats to all the staff.

*Best regards,*

*Pedro Nuno Costa Monteiro*
*Clinica PCM, Portugal*

This course was very well organized and very educational. The lectures were clinically innovative and could be applied in the office readily. I truly admire Dr. Chang. I think he is awesome and clinically fantastic. I think this has been a really great clinical opportunity, and the whole team has been really great. I would definitely recommend this course.

Congratulations to all.

*Best regards,*

*Eduardo Padros Serrat,*
*Clinica Dental Padrós Muntaner, Spain*

I'm impressed with everything, from staff, patient consultations, course arrangement, accommodation to food arrangement and beyond. Most importantly, I'm grateful that Dr. Chang is so willingly and keen to share his experiences. It's a great course to attend. I truly enjoy it. I will definitely recommend it to my colleagues.

*Ming Wei Goh,*
*Mokoia Road Dental Centre, Malaysia*

Attending this workshop was a great learning experience with great networking exposure. All sessions were very informative. And more importantly, we can apply what we learned immediately. This is a very important chance to meet colleagues from other countries. Chris Chang's philosophy updates our previous knowledge and gives us a vision of what the future of Orthodontics will look like.

*Mohamed El Mehdi Echchadi,*
*Ariha Dental Center, Morocco*

JULY
12–14

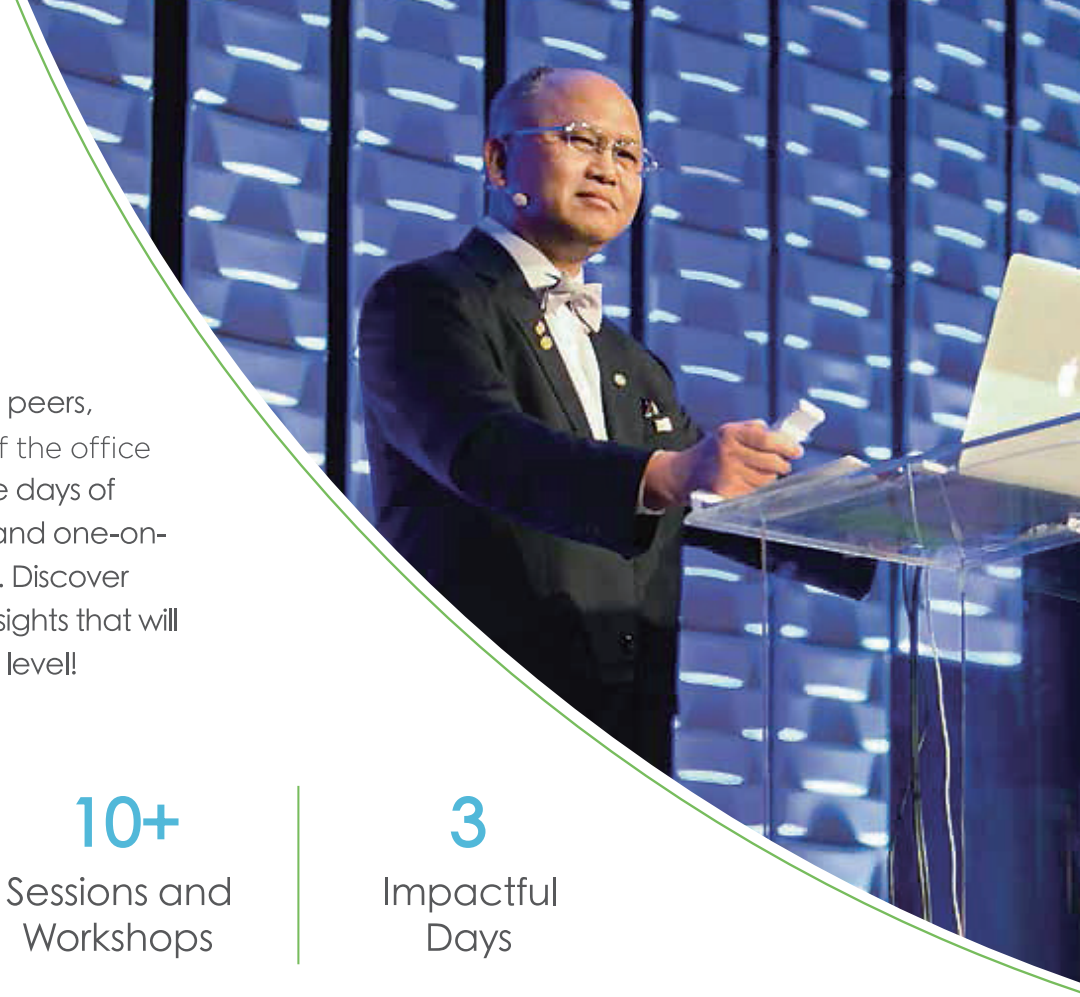
BANGKOK
THAILAND

Experience
the Power of
Collaboration

# THE ASIAN DAMON FORUM 2017

DAMON™ SYSTEM

Ormco™



Join world-renowned experts, peers, and friends in stepping out of the office to experience three incredible days of impactful clinical education and one-on-one networking opportunities. Discover new tools, mechanics, and insights that will take your practice to the next level!

| 8 | 10+ | 3 |
|---|---|---|
| World-Renowned Speakers | Sessions and Workshops | Impactful Days |

## PRE-FORUMS
## WEDNESDAY, JULY 12

### DR. FRANK BOGDAN

### Damon™ Essentials Seminar

This optional one-day seminar is designed as an entry-to-intermediate-level course, focusing on elements essential to setting up a simplified force system utilizing the Damon System and its recommended Passive Self Ligation (PSL) mechanics. Dr. Bogden will lead participants from the fundamentals of the Damon philosophy to a deeper knowledge of how to employ simplified PSL based on over 20 years of clinical documentation. Complete case presentations of early treatment, Class II, Class III, adult, and pre-prosthetic cases will be reviewed to provide a full appreciation of the keys to success with PSL orthodontics.

### DR. KYOTO TAKEMOTO

### Alias™ —A PSL Lingual Straight-Wire System

This optional one-day seminar will provide you with the knowledge to successfully perform Lingual orthodontics using Alias—The first PSL, square slotted, straight-wire lingual bracket. Attendees will not only learn the basic principles and theory of lingual orthodontics, but also understand the clinical methods, treatment sequences, and the potential of the straight-wire lingual technique to maximize efficiency and optimize results with each patient.

# THE ASIAN DAMON FORUM 2017

## Agenda

### WEDNESDAY, JULY 12

| | |
|---|---|
| 7:30am–8:30am | Pre-Forum Registration |
| 8:30am–4:00pm | Dr. Frank Bogdan<br>Pre-Forum: Damon Essentials Seminar*<br>The Keys for Success in Starting and Finishing with PSL |
| 8:30am–4:00pm | Dr. Kyoto Takemoto<br>Pre-Forum: Alias PSL Lingual Straight Wire System* |
| 3:00pm–5:00pm | Early Forum Registration Open |
| 6:00pm–8:00pm | Welcome Reception |

### THURSDAY, JULY 13

| | |
|---|---|
| 7:30am–8:30am | Forum Registration |
| 8:30am–10:30am | Dr. John Lin<br>The Latest on Simple and Efficient Class III TAD Treatment<br>Combining TADs and PSL for Non-Extraction Treatment in Class II and Class I Crowding Cases |
| 11:00am–12:30pm | Dr. David Birnie<br>Digital Orthodontics Made Easy<br>Managing Posterior Crossbites without Expanders |
| 12:30pm–1:30pm | Lunch |
| 1:30pm–3:00pm | Dr. Sonia Palleck<br>Solving the Puzzle: Using Insignia to Help Simplify Treatment Mechanics |
| 3:30pm–4:30pm | Dr. Sabrina Chiung-Hua Huang \| Dr. Park Chang Suk<br>Case Presentations |

### FRIDAY, JULY 14

| | |
|---|---|
| 8:30am–10:30am | Dr. Frank Bogdan<br>PSL Trouble-Shooting: Reading and Reacting During Treatment |
| 11:00am–1:00pm | Dr. Kyoto Takemoto<br>You Can Treat Lingual Patients the Same as Labial Patients with Alias |
| 1:00pm–2:00pm | Lunch |
| 2:00pm–5:00pm | Dr. Chris Chang<br>Non-Surgical Treatment for Challenging Cases with Damon System and TADs |
| 5:00pm | Adjourn |

*Additional fee applies to optional sessions. Limited seating available. Pre-registration required.

**Register your practice at**
**forum.ormco.com/asia**

Dr. John Lin
Taiwan

## The Latest on Simple and Efficient Class III TAD Treatment

Temporary Anchorage Devices (TADs) have made it possible to treat many difficult Class III cases that had been thought too difficult or even impossible to treat using traditional orthodontics. Dr. Lin will review the latest, popular ways of using TADs to treat Class III cases, demonstrating the simplicity and efficiency of TAD Class III treatment. He will illustrate clear-cut ways of using Infrazygomatic (IZC) and buccal shelf screws, including indications, details of screw placement, and CBCT analysis of the screw position to avoid screw interference, showing multiple Class III cases treated with these methods.

## Combining TADs and PSL for Non-Extraction Treatment in Class II and Class I Crowding Cases

Traditionally, extraction therapy depended primarily on the degree of space deficiency. Since the development of PSL and low-friction mechanics, orthodontists can accommodate complete dentitions in many more crowded cases with non-extraction treatment. This means clinicians can now base the decision to extract primarily on the patient's profile, extracting for facial enhancement.

While the pendulum has moved toward non-extraction therapy, extractions are still warranted for specific patient needs. With the most recent developments in TADs, distalizing the entire upper or lower dentition has become easily achievable and routine. The combination of PSL and TADs are having an evolutionary impact on extraction treatment in orthodontics. Dr. Lin will share state-of-the-art thinking in determining whether or not to extract, demonstrating treatment plans for cases with various malocclusions as well as showcasing combination PSL/TAD therapy that makes extraction treatment straight-forward and efficient.

Dr. David Birnie
UK

## Digital Orthodontics Made Easy

Digital technologies are increasingly driving the future of orthodontic care. Insignia—a fully interactive treatment planning software and customized fixed, labial appliance system—is leading the way in developing a sophisticated means of delivering superior results in short treatment times. Optimizing Insignia requires a full understanding of occlusion and smile design and good communication between clinician and technician. Knowledge of its capabilities and limitations is also critical to successful use.

## Managing Posterior Crossbites without Expanders

PSL has made the correction of crossbites without using expanders such as quad helices and rapid palatal expanders much easier. The question then becomes: "Is your expander really necessary?" Dr. Birnie will examine several techniques for employing PSL for crossbite correction via low-force transverse arch adaptation and will cover archwire and elastics selection and the benefits of disclusion. He will also share the evidence basis for the techniques shown as well as review the difference in outcomes between expansion with and without expanders.

Dr. Sonia Palleck
Canada

## Solving the Puzzle: Using Insignia to Help Simplify Treatment Mechanics

Dr. Palleck will present how digital orthodontics has changed the way orthodontists approach unraveling a patient's malocclusion. Starting with the solution in sight—each patient's unique digital setup—you will discover how digital orthodontics simplifies treatment mechanics. This makes decision-making process for the doctor much more direct and treatment much more predictable. Learn how to tackle difficult cases with confidence using Insignia's straight-forward, yet advanced computerized tools. Dr. Palleck will outline the standards for a well-finished result and how—with these goals in mind—you are able to leverage digital technology to achieve these goals in less time and with fewer visits by making smart moves during treatment.

Dr. Frank Bogdan
U.S.A.

## PSL Trouble-Shooting: Reading and Reacting During Treatment

Dr. Bogdan will demonstrate basic protocols to keep your cases running smoothly and manage issues that reduce treatment efficiency. The key is to identify the problem, understand why it happened, react to it quickly and resolve it efficiently. Armed with his proven case management strategies, you will be able to avoid common problems. The discussion will include: Arch Coordination (how to easily avoid a common misstep); Rotation Control (identifying the problem and making the simple fix); Torque Control (understanding why holding couples are key to torsion control and how to start that control early); Vertical Control (discovering why bite turbos and early elastics are essential for open and deep bite cases and where to employ them); Reducing Unwanted Side Effects (minimizing and managing incisor flaring).

Dr. Kyoto Takemoto
Japan

## You Can Treat Lingual Patients the Same as Labial Patients with Alias

The conventional lingual orthodontic approach today still uses the mushroom archform, which involves complicated handling, and manual or robotic archwire bending, resulting in difficult mechanics and upper-lower coordination. In order to compensate these for these problems, Drs. Takemoto & Scuzzo developed and patented the Lingual Straight Wire (LSW) and Square slot bracket. This revolutionary approach using Alias, the first passive self-ligating square slot brackets and plane lingual arch-form, offers the doctor improved biomechanical control, making treatment easier and simplifying the procedure. Accurate bracket placement coupled with reduced wire bending reduces chair-time while improving the quality of results and patient comfort.

Dr. Chris Chang
Taiwan

## Non-Surgical Treatment for Challenging Cases with Damon System and TADs

Many patients in Asia prefer minimal, non-surgical treatment methods. Such preferences pose a real challenge for clinicians to develop creative solutions in delivering a mutually satisfactory result with given limitations. In his lecture, Dr. Chang will present several complex adult cases, detailing simplified, non-surgical solutions to common problems all orthodontists face.

CLINICAL CASE PRESENTORS

Dr. Sabrina Chiung-Hua Huang
Taiwan

Dr. Park Chang Suk
South Korea

5TH ANNUAL

# Asian Damon Forum

## SHANGRI-LA HOTEL | JULY 12-14, 2017

89 Soi Wat Suan Plu, New Road, Bangrak
Bangkok, Thailand

Discounted room rates available at shangri-la.com
using discount code ORM110717.

## TUITION

**$500 Forum Tuition**
**$550 Forum & Pre-Forum Tuition**

Prices are per person and in $USD.

Register at
**forum.ormco.com/asia**

For more information, please contact your local Ormco dealer.

| DEALER | COUNTRY | PHONE | EMAIL |
|---|---|---|---|
| Bangladesh Prayashi | Bangladesh | + 88 02 5861 3852 | prayashi@prayashi.com |
| PT Cahaya Tiga Bintang Abadi | Indonesia | + 819 604 2000 | anitasiregar.siregar@gmail.com |
| Shinhung Co Ltd | Korea | + 822 6366 2127 | boyoungkim@shinhung.co.kr |
| Calmal Sdn Bhd | Malaysia | + 60 3 9058 2717 | calmal@tm.net.my |
| Garg Dental PVT Ltd | Nepal | + 977 14436276 | umeshgarg73@gmail.com |
| AVM Ortho Inc | Phillippines | + 632 843 6208 | edsanagustin@yahoo.com |
| Orthodontic & Dental Supplies Pte Ltd | Singapore | + 65 6732 0533 | odsortho@gmail.com |
| La Solve Pvt Limited | Sri Lanka | + 94 71 4742393 | healthhub@gmail.com |
| Yong Chieh Enterprise Co. Ltd | Taiwan | + 886 2 2778 8315 | yonchieh@seed.net.tw |
| Accord Corporation Limited | Thailand | + 662 119 4933 | nattharom@accorddental.com |
| Tuyet Hai Pharmaceuticals Ltd Co | Vietnam | + 84 984 82 9999 | hkngan.tuyethai@gmail.com |



Ormco

活動期間：自 **2017/1/1 - 3/25** 止

# ASIAN 2017 DAMON FORUM 專案

Ormco
Your Practice. Our Priority

## 任選一

### 好康一

DAMON

5┼5 / 5┼5 30人份 或 60盒

(定價NT$7,770 /10顆/盒，**特價NT$5,000**/盒)

### 好康二

DAMON CLEAR / DAMON CLEAR2

5┼5 / 5┼5 20人份 或 40盒

(定價NT$14,000 /10/顆/盒，**特價NT$7,000**/盒)

### 好康三

DAMON 3MX

5┼5 / 5┼5 50人份 或 100盒

(定價NT$6,660 /10顆/盒，**特價NT$3,330**/盒)

### 好康四

ALIAS

7┼7 / 7┼7 10人份

(定價NT$33,000 /人份/盒)

## 贈

ASIAN 2017 DAMON FORUM

演講報名費 **USD$500** ＋ **7/12-14**三晚單人標準客房

(註1: 此優惠方案不再加贈任何贈品，註2: 此Damon Forum專案至5/25止)

## 買

ACCENT mini

12 盒 **贈** 12盒 **買** 6|6 / 6|6 **送** 7|7 / 7|7

(定價NT$3,500/10顆/盒)

- **低高度設計**
  降低咬合干擾，病人配戴更舒適
- **底座採專利雷射雕刻(laser-etched)處理**
  增加黏著強度
- **Lower 6th 獨特 “T” hook設計**
  彈力裝置雙向運用，病人配戴更舒適

## 再贈

Grēngloo Unidose X1包(4g/包)
新一代雙色光照金屬矯正器黏著劑


(定價NT$5,900/包)

## 買


Enlight Unidose x5包(4g/包)
光照含氟矯正專用黏著劑-子彈型

Ortho Solo x2瓶(5ml/瓶)
多功能光照基底劑

特價 **NT$7,200**

(定價NT$14,900元)

＊衛署醫器輸壹字第010513號 ＊衛署醫器輸字第022355號＊衛署醫器輸字第020312號 ＊衛署醫器輸字第010924號＊衛署醫器輸字第010954號 ＊衛部醫器輸字第027158號

總代理 湧傑 YONG CHIEH 訂購專線：北區 (02)2778-8315 · 中區 (04)2305-8915 · 南區 (07)226-0030

・本文宣品僅供牙科診所及牙醫師參考，禁止張貼或擺置於公眾可瀏覽及取閱之處

・本優惠專案僅適用於牙醫診所・本公司保留贈品更換之權利・本公司保留更改及終止活動辦法與條款之權利

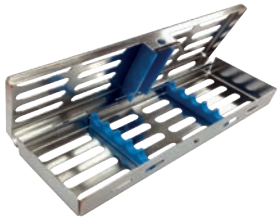
Hu-Friedy carl marlin Solingen

# 器械全面6折 SALE

活動期間：
自 2017/1/1 - 3/25 止

## PERIO 器械優質組

任選 LS972 系列 Curette/Scaler x 5支
+ CM3011 器械盒 x 1個

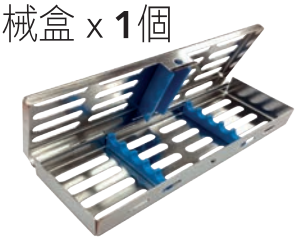


優惠價$5,999元/組

(定價$11,600元/組)

## O.D. 器械超值組

任選 Polyfill Plasma+ 系列
Composite Instrument x 5支
+ CM3011 器械盒 x 1個



優惠價$5,999元/組

(定價$11,100元/組)

### GRACEY CURETTES


GRACEY curette, Fig. 1-2 LS972/1-2


GRACEY curette, Fig. 3-4 LS972/3-4


GRACEY curette, Fig. 5-6 LS972/5-6


GRACEY curette, Fig. 7-8 LS972/7-8


GRACEY curette, Fig. 9-10 LS972/9-10


GRACEY curette, Fig. 11-12 LS972/11-12


GRACEY curette, Fig. 13-14 LS972/13-14


GRACEY curette, Fig. 15-16 LS972/15-16

(定價$1,600元/支)

### UNIVERSAL CURETTES


COLUMBIA universal curette LS960/4R-4L


universal curette, premolars + molars, upper and lower LS961/M23A

(定價$1,600元/支)

### FILLING INSTRUMENTS POLYFILL PLASMA+

2,4mm/9,0mm long tip | 0,65mm Ø 1,3mm/7,0mm long

LS1051/25C

1,4mm/10,0mm long tip | 0,30mm 10,0mm long 1,4mm

LS1051SF/1

1,0mm 0,7mm

LS1051/94

1,3mm 1,8mm

LS1051/95

1,75mm 1,75mm

LS1051/MB4


LS1051/207-208M


LS1051/12A


LS1051/104

(定價$1,500元/支)

### GOLDSTEIN POLYFILL PLASMA+

2,0mm/10,0mm long tip | 0,35mm Ø 1,5mm/7,0mm long

LS1051F/81

2,4mm/10,0mm long tip | 0,35mm Ø 1,8mm/7,0mm long

LS1051F/82

(定價$1,500元/支)

### 限時加購價

凡購買 carl marlin Solingen 系列產品

即可加購 持針器 CASTROVIEJO
LS1152TC/16 或 LS1152TC/18

一支$5,500元
二支$10,000元


TC = tungsten carbide


TC

CASTROVIEJO

LS1152TC/16 (定價$9,300元/支)
16cm

LS1152TC/18 (定價$9,700元/支)
18cm

・衛部醫器輸壹字第015200號

湧傑 YONG CHIEH 訂購專線：北區 (02)2778-8315・中區 (04)2305-8915・南區 (07)226-0030

"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.

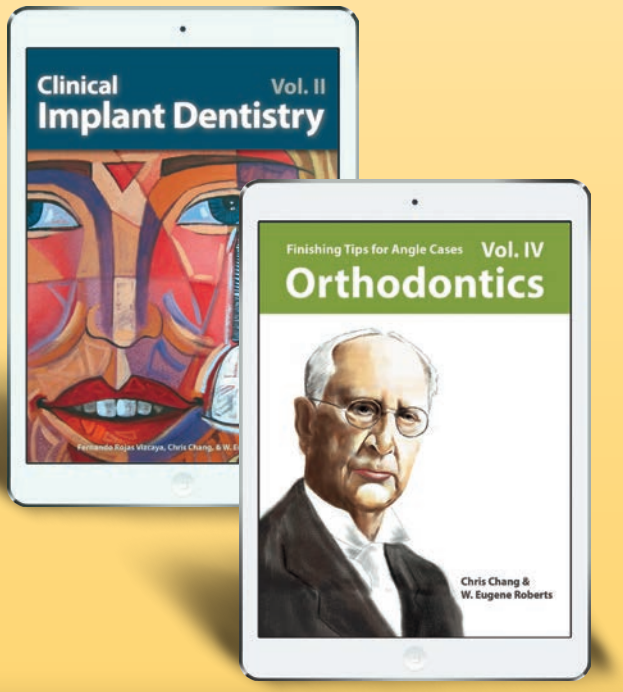
*Dr. Don Drake, South Dakota, USA*

"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*


The 26th Beethoven international workshop, Beethoven Orthodontic center. Participants take a photo with Dr. Chris Chang (red tie).

ISSN 2079-6862
9 772079 686201