Hyperdivergent Class III,
Open Bite Malocclusion Treated Conservatively
Drs. Ming Chen Lee, John Lin & W. Eugene Roberts

Paradigm Shift in Class III Treatment with TADs
Dr. Johnny JL Liaw & W. Eugene Roberts

Combined Implant-Orthodontic Treatment for an Acquired Partially-Edentulous Malocclusion with Bimaxillary Protrusion
Drs. Ming-Jen Chang, Chris Chang & W. Eugene Roberts

Early Intervention of Class III Malocclusion and Impacted Cuspids in late mixed dentition
Dr. Yu Lin Hsu, Chris Chang & W. Eugene Roberts

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2012 International Beethoven Damon and OBS Workshop; Drs. John Lin (center), Chris Chang (center right) and participants from Singapore, Vietnam, USA, and Benin.

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《僅供牙科專業人士參閱》

2012~2013 熱愛學矯正

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

學會開始做矯正需多久？

39小時讓您入門矯正。本課程採高效學習法及高效矯正簡報法 - Keynote，在舒適、輕鬆的環境下，學會簡單有效的矯正方法，教室與診間結合，讓您現學現用，立即熟悉各種習得的技巧，而不需太多課後複習。全程以 In-Office Training 方式，用病例帶動分析、診斷，治療計畫與療程技巧，每一步驟皆以圖片及影片教學，讓您很難錯失任何環節，更沒有聽不清楚或無法理解的可能。為提高課後自我學習及臨床印證之效率，另備有教學電子檔，供學員家中研習。我們的終極目標是：用最短時間、最輕鬆的方式，讓每位學員 - *熱愛矯正學、熱愛學矯正。*

Damon + .014 Cu NiTi

Damon Clear

Damon矯正課程

【課程】9:00 - 12:00
【實習】另外安排

使用最新一代矯正器 Damon Q 進行課程，歡迎舊生報名參加。

★★ 基礎班 預計 2013/06 台北/台中 新課程登場

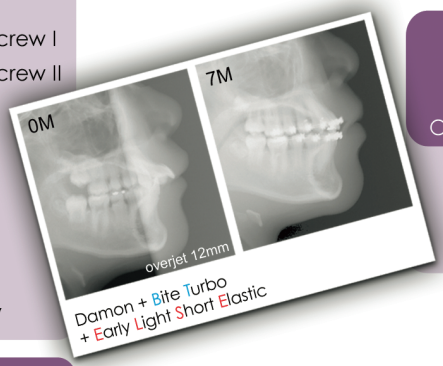
	台北 (二)	高雄 (四)	LECTURE	LAB
1	10/2	10/11	理想入門病例+Damon Q黏著	Bonding (Damon Q) + BT
2	10/9	11/22	快速矯正療程四部曲	Ceph + Photo
3	10/23	12/13	簡捷有效的錨定系統	Damon + OrthoBoneScrew I
4	11/27	1/10/13'	不拔牙與拔牙分析	Damon + OrthoBoneScrew II
5	12/11	3/7	Damon 診斷流程及微調	Finish Bending
6	1/8/13'	3/28	完工檢測及報告示範	Fixed Retainer (FR)
7	3/5	4/11	維持及復發；病例示範	Presentation Demo
8	3/12	4/18	矯正力學及診斷分析 (1)	DDX + Case Reports I
9	3/26	5/16	軟硬組織及診斷分析 (2)	DDX + Case Reports II
10	4/9	5/30	兒童矯正及診斷分析 (3)	DDX + Case Reports III
11	4/23	6/6	成人矯正及診斷分析 (4)	DDX + Case Reports IV

矯正植體課程

【課程】 9:00 - 12:00
【實習】13:30 - 20:00

矯正植體的操作時機、植法與實習、個案討論、臨床跟診及實作示範。

新竹(三) 2013 10/16 (含午、晚餐)



Damon + Bite Turbo + Early Light Short Elastic

International workshop

Keynote & managment
OrthoBoneScrew & Damon

2013
A班 6/18-20
B 班 11/19-21

矯正進階課程

【新竹】 9:00 - 12:00
【高雄】14:00 - 17:00

以病例討論為主軸，培養學員如何正確診斷及快速排除臨床疑點，課程中亦訓練每位學員善用 Keynote。

	新竹 (四)	高雄 (四)	Paper Reviews	Topics & Case Demo
1	7/5	10/11	Bracket Placement	Crowding: Ext. vs. Non-ext.
2	7/26	11/22	Impacted Canines	Upper Impacted Teeth
3	9/27	12/13	Canine Substitution	Lower Impacted Teeth
4	11/1	1/10/13'	Missing 2nd Premolar	Missing: Ant. vs. Post.
5	12/20	3/7	DI Workshop	Crossbite: Ant. vs. Post.
6	1/3/13'	3/28	CRE Workshop	Open Bite High Angle
7	2/21	4/11	Excellence in Finishing (occlusion)	Deep Bite Low Angle
8	3/21	4/18	Excellence in Finishing (esthetics & perio)	Gummy Smile & Canting
9	4/25	5/16	Ortho-Perio-Restore Connection	Esthetic Finishing (Transposition)
10	5/9	5/30	Adjunct to Perio	Implant-Ortho
11	5/23	6/6	Unhappy Patient	IDT - Adult Complex

助理訓練課程

【課程】10:00 - 14:30
【實習】15:00 - 20:00

每梯次共兩堂課程與技術操作，內含照相技術、Morph 與公關衛教之電腦資料處理；另安排一次診所見習。

新竹(五) 2013 10/11、18 (含午、晚餐)

矯正精修課程

【課程】9:00 - 12:00

協助每位學員了解由古典到現代之文獻，進而應用於實際病例；並藉由DI及CRE讓精緻完工（Excellent Finishing）變成易達到的目標。

新竹 (二) 精修IV 5/22 6/19 7/10 8/14 9/18 10/16 11/20 12/18
1/15/13' ~~3/19~~ 4/16 5/21 (原 3/19 取消，改 5/21)

課 程 資 訊

上課地點

【台北】
恒毅資訊中心 畢卡索廳
/ 台北市復興北路號99號12樓
(捷運南京東路站旁)

【新竹】
金牛頓藝術科技公司
/ 新竹市建中一路25號2樓

【台中】
中國文化大學台中教育中心
/ 台中市西屯區中港路二段
128之2號3樓

【高雄】
國立科學工藝博物館-南館
/ 高雄市三民區九如一路797號
(107研討室)

報名專線

湧傑 Yong Chieh

北區
(02) 27788315
楊文君 /李芊卉

中區
(04) 23058915 張馨云

南區
(07) 5361701 王慧靜

＊每次上課請依最新一期 IJOI 公告為主

Let's invent the future together!

Missing teeth is a common problem in our daily clinical practice, whether you are a GP or a specialist. Chronic tooth loss often results in tilted adjacent teeth, elongation of antagonistic teeth, bone resorption in the edentulous zone, and even maxillary sinus pneumatization. These issues present great challenges for orthodontic or implant therapy. Well designed orthodontic treatment can create more favorable soft and hard tissue conditions and establish a solid foundation for following prosthetic or implant therapy.

Regretfully this is not what we normally observe in our patients. All too often patients receive, what I call *"fast food implant therapy"* , by only filling up the space with implants when obvious malocclusion and mal-alignment are neglected and untreated. Since late 2010 we have embarked a journey to challenge such practice, and engage in the development of more orthodontic and implant combined treatment. The first international professional association, the *International Association of Orthodontists and Implantologists*, was formed and the first annual meeting was held in December 2011 in Taipei, Taiwan. In this year's annual symposium, we are excited to have *Dr. Thomas Han* from UCLA, Dr. *Kwang Bum Park* from South Korea, our very own Dr. *John Lin* and myself to share our lessons learned in implant dentistry and ortho-implant combined treatment. In addition, six doctors from a new generation have taken up the challenge to become the first class of IAOI diplomates by presenting their ortho-implant combined case report.

As Steve Jobs said, "*We are proud of what we do and what we don't do.*" I'm equally proud to say that the kind of work we are doing is to invest in the future of dentistry for the wellbeing of our patients-our parents and children. And just as what Jobs confidently and rightfully announced, "*the best way to predict the future is to invent one,*" I sincerely invite you to join us in inventing a better future for our profession. I expect to see all of you at the second annual conference titled, *A symphony of Orthodontics and Implantology* on *December 9, 2012* in Taipei, Taiwan.

Chris Chang DDS, PhD, Publisher

Hyperdivergent Class III, Open Bite Malocclusion Treated Conservatively

History And Etiology

A 17-year-9-month-old female presented for orthodontic consultation with chief complaints of anterior cross bite, open bite, and irregular dentition. She was previously advised by several orthodontists that surgery was the only viable option for correcting her malocclusion and facial asymmetry (*Figs. 1-3*). There were no contributing medical, dental or family histories. The etiology of the malocclusion was unknown, but it is probably genetic based on the nature of the malocclusion. The patient was treated to an optimal result as documented in Figures 4-6 without orthognathic surgery, extraoral anchorage or myofunctional therapy. No complex orthodontic appliances, such as rapid palatal expander (*RPE*) or lingual holding arch, were used. The cephalometric and panoramic radiographs documented the pre-treatment condition (*Fig. 7*) and the post-treatment results (*Fig. 8*). The cephalometric tracings before and after treatment are superimposed in Figure 9, and the summary of cephalometric measurements is provided in Table 1.

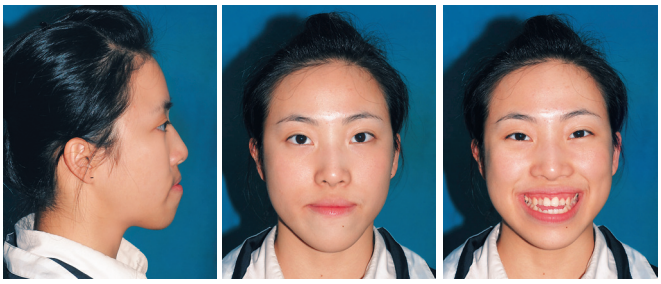


Fig 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment study models

Diagnosis

Skeletal:

- Skeletal Class I (*SNA 84°, SNB 83°, ANB 1°*)
- Hyperdivergent mandibular plane angle (*SN-MP 46°, FMA 38°*)

- Facial asymmetry: mandible deviation to the left

Dr. Ming Chen Lee, Lecturer, Beethoven Orthodontic Course (left)
Dr. John Jin-Jong Lin, Chief Consultant of IJOI (middle)
Dr. Eugene W. Roberts, Consultant,
International Journal of Orthodontics & Implantology (right)

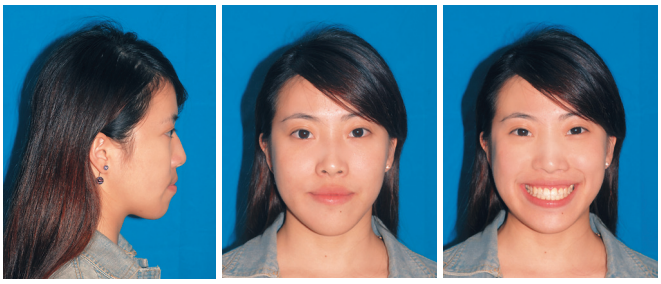


Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

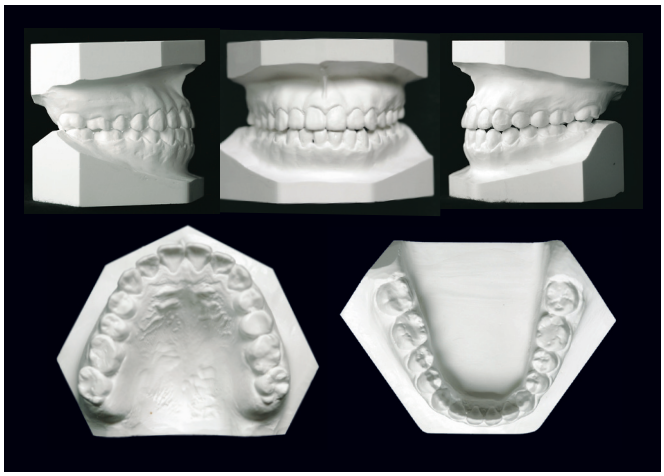


Fig. 6: Posttreatment study models

Dental:

- Bilateral full cusp Class III molar relationship
- Bilateral Class III canine
- In Centric Occlusion the OJ was -3mm, and the OB was -3mm
- 2mm space deficiency in upper arch 1mm space deficiency in lower arch

Facial:

- Moderately convex profile (*Fig. 1*) Protrusive lower lip

The ABO discrepancy index (*DI*) was 55, as documented in the subsequent DI worksheet, which qualifies as a major malocclusion (*DI >20*).

Specific Objectives Of Treatment

The overall objectives of treatment were to achieve a counter-clockwise rotation of the occlusal plane to facilitate the correction of the class III malocclusion, and to retract the mandibular incisors to relieve the negative overjet. The specific treatment objectives were:

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

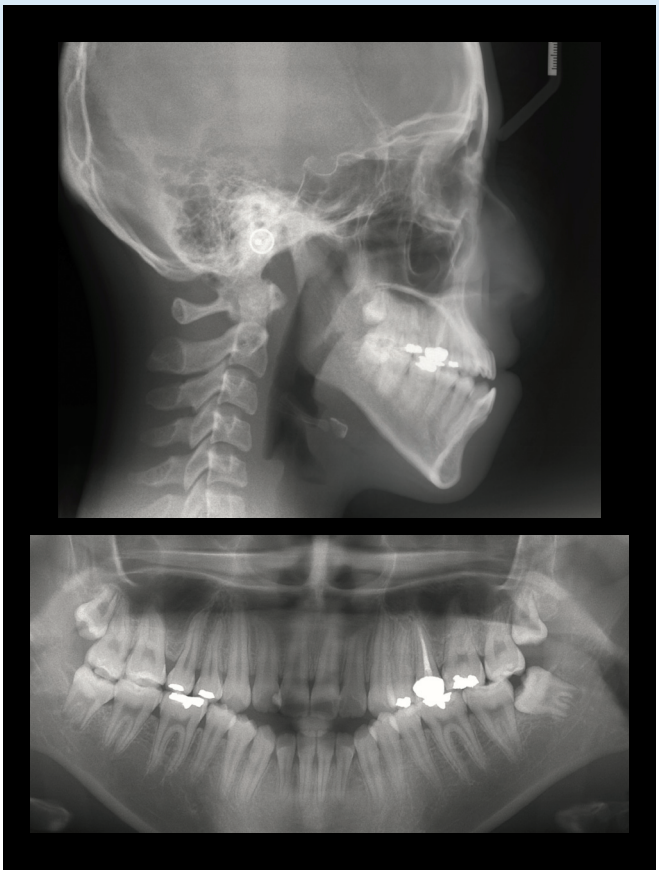


Fig. 7: Pretreatment pano and ceph radiographs

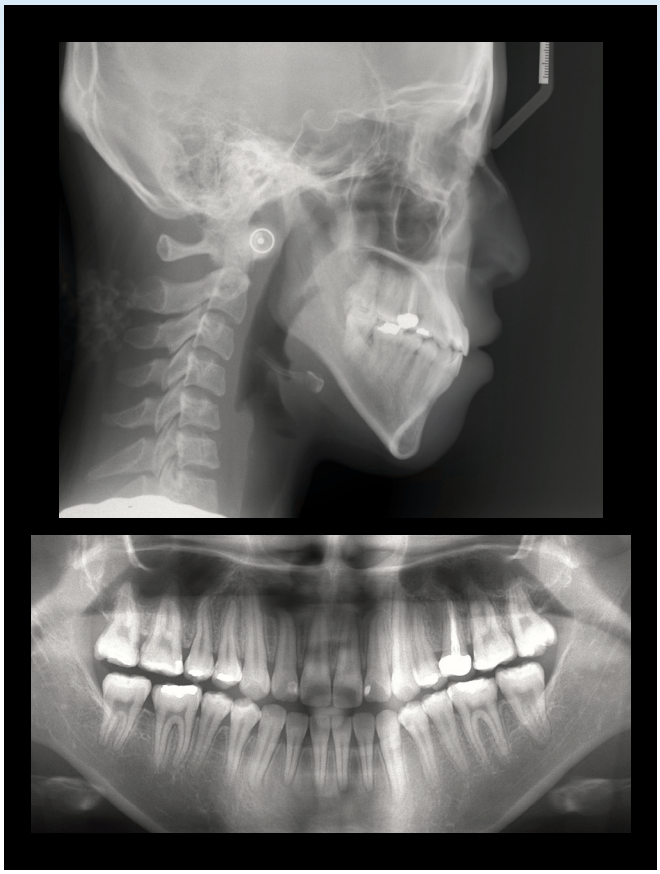


Fig. 8: Posttreatment pano and ceph radiographs

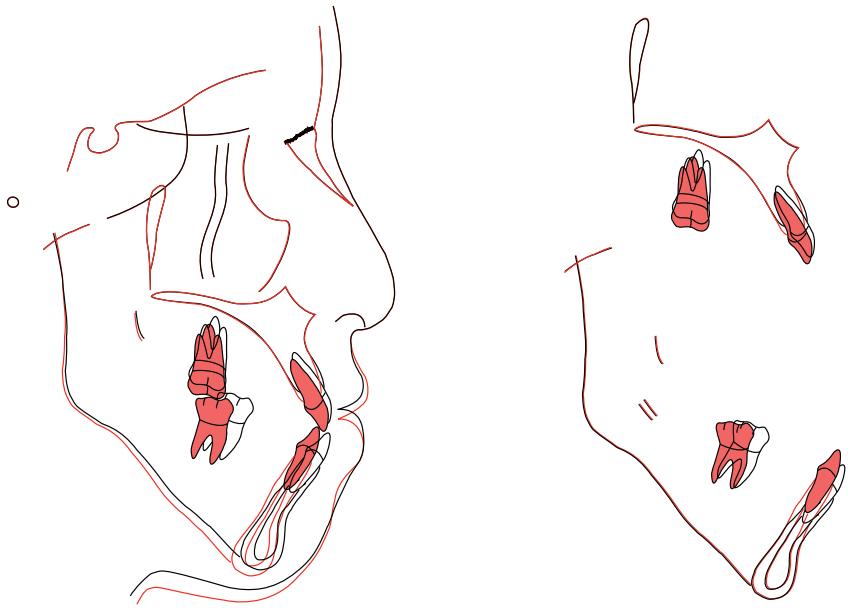


Fig. 9:

Superimposed tracings. Superimposition on maxilla revealed retraction and extrusion of anterior teeth, extrusion of molars. The mandible revealed maximal retraction and extrusion of anterior teeth, intrusion and tip back of molars. These contributed to correction of anterior cross-bite and vertical dimension opening.

- A - P: Retract
- Vertical: Modest increase
- Transverse: Maintain

Maxillary Dentition :

- A - P: Retract incisors
- Vertical: Extrude
- Inter-molar / Inter canine Width: Expansion to relieve crowding

Mandibular Dentition:

- A - P: Retract the entire mandibular dentition
- Vertical: Maintain molars and extrude incisors to correct openbite
- Inter-molar / Inter-canine Width: Expansion to relieve crowding

Facial Esthetics:

- Retract lower lip to improve facial balance.

Treatment Plan

Extract all four 3rd molars before orthodontic treatment. The passive self-ligating bracket system (*Damon Q*) was indicated. Bilateral extra-alveolar bone screws (*2mmx12mm SS*) were inserted in the buccal shelves to serve as osseous anchorage (*Figs. 10-11*) to resolve the sagittal occlusal discrepancy. Following removal of fixed appliances, the corrected dentition was retained with upper Hawley and lower spring retainers.

Appliances And Treatment Progress

The patient was referred for extraction of all third molars before the start of orthodontic treatment. Low torque brackets, .022" slot Damon Q® (*Ormco*), were used on the upper arch, and standard torque brackets were bonded on the lower arch. Both arches were initially aligned with .014" CuNiTi arch-wires. In the 1st month of treatment, power chains were applied between the lower first molar and lateral incisors for rotation control (*Fig. 12*). In the 2nd month, .014x.025" CuNiTi arch-wires were placed, and bone screws (*2mmx12mm SS*) were installed in the mandibular buccal shelves bilaterally, with apically positioned flap procedures (*Fig. 11*). The bone screws were used to provide anchorage to retract the entire mandibular dentition while intruding the

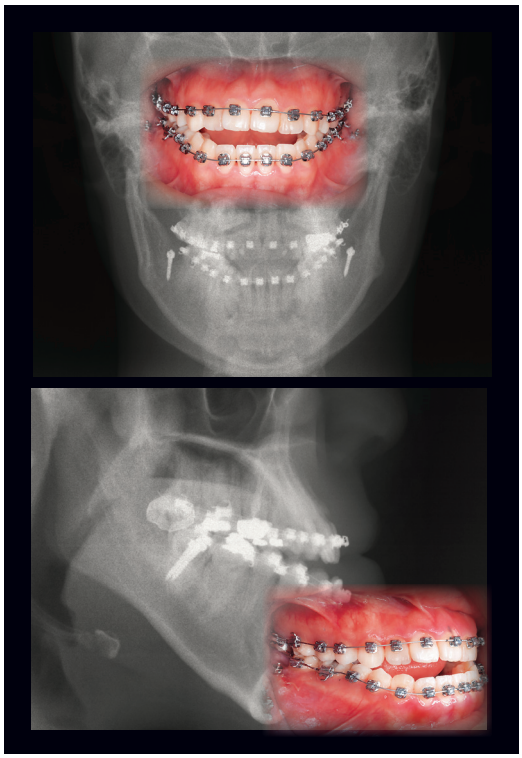


Fig. 10:

2mmx12mm SS bone screws placed 47-46, 36-37 (apically position flap). The PA cephalogram, shows the buccal shelf bone screws were outside the mandibular molar roots, these made the distalization of the whole mandibular dentition possible.

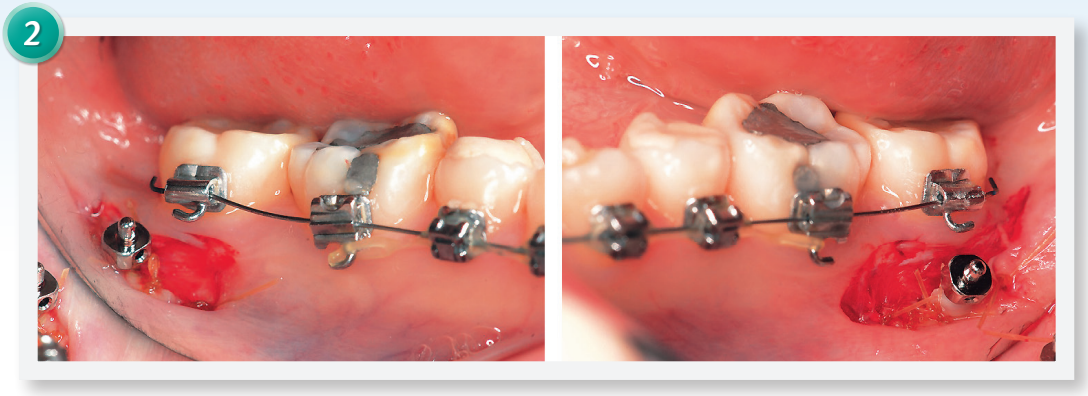


Fig.11:

The buccal shelf areas had not enough zone of attached gingiva, Tow bone screws (2x12mm) were placed with an apically positioned flap around the screws.

molars. In the 8th month, brackets were rebonded as needed and power chains were applied for rotation control (*Fig. 13*). The lower arch-wire was changed to .017x.025" low friction TMA, and retraction coil springs were applied for retraction of the whole lower arch. In the 10th month, the upper arch-wire was changed to .014x.025" CuNiTi, the lower arch-wire was changed to .019x.025" SS. The closed coil springs (*12oz on the right and 11oz on the left*) from the bone screws to the canine areas were continued for the correction of sagittal occlusal discrepancy and the lower midline deviation. Square elastic threads (*.026x.026", Rocky Mountain, Co. J00181*) were tied from the buccal tube of lower second molars to the holes in the platform of the bone screws to intrude the molars, and help correct the anterior open bite. The hook on the lower right second molar was ground off to facilitate continued retraction of the arch (*Fig. 14*). In the 11th month, the anterior cross-bite was corrected to almost an edge-to-edge position (*Fig. 15*). In the 13th month, diagonal elastics (*3/16, 4.5oz, Kangaroo, Ormco*) were used to correct facial midline discrepancy (*Fig. 16*). After two months, the facial midline was much improved (*Fig. 17*). In

Fig. 12: 46-42, 32-36 power chain for correct rotation

Fig. 13: 16-12, 22-26 power chain for rotation control

the 18th month, the upper arch-wire was changed to .017x.025" low friction TMA, and the lower bone screws were removed. Use of the diagonal elastics continued.

In the 21st month, the upper arch-wire was changed to .019x.025" low friction TMA. In the 22nd month,

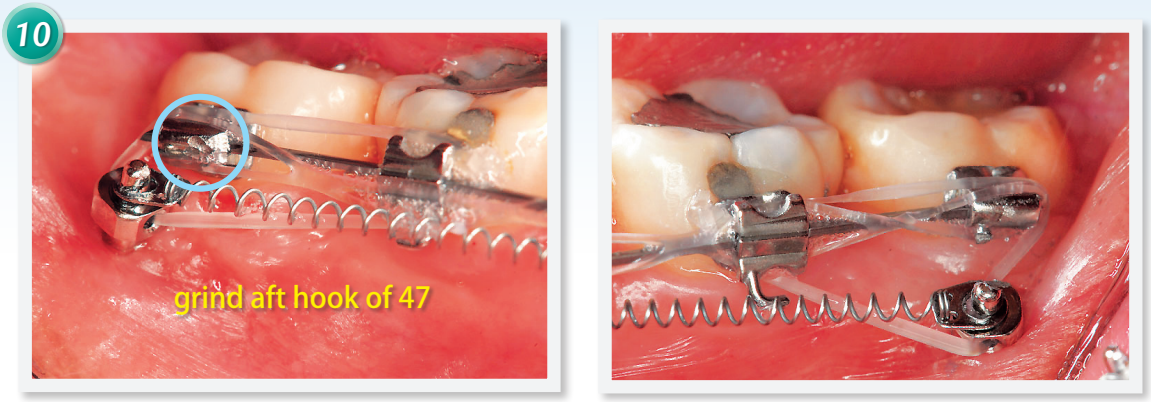


Fig.14:

.026x.026 square elastic thread were used to intrude the lower molars. Watch power chain was used to prevent space opening before 2nd molars, put elastic thread through the hole of the mini-screw and tie directly to the 2nd molar tube. During distalization, sometimes the hook of molar tubes will be right in front of the bone screw, for continuing distalization, the hook should be ground off.

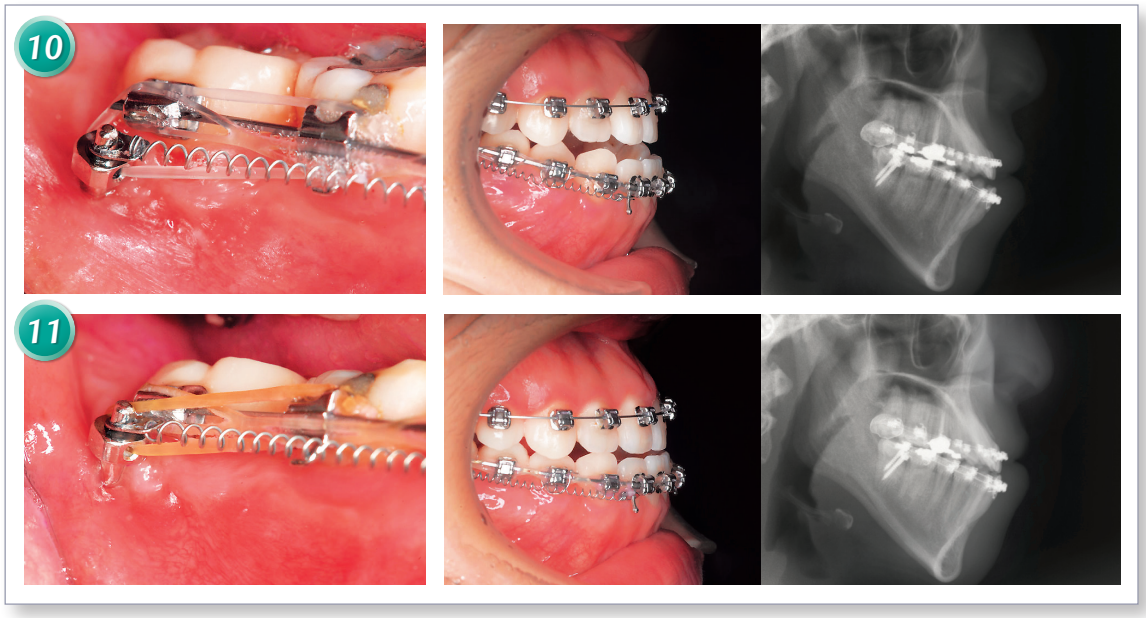


Fig.15:

After 1 month of retracting the whole dentition distally, the anterior cross-bite was corrected to almost edge-to-edge position, the molars were intruded, notice the distance between screw head and tube hook get much closer.

a panoramic radiograph was exposed to evaluate bracket positions relative to the axial inclinations of the teeth. At that time, the major problem was the distal tipping of the mandibular right 1st molars, and the posterior open bite that resulted from the tip-back effect, due to the retraction of the lower dentition with the buccal shelf bone screws. The patient requested premature treatment termination, because she was planning to study abroad, so it was necessary to accept the distal crown tipping of the lower molars. Multiple brackets were rebonded and the arch-wires were changed to .016" NiTi. In the 23rd month of treatment, periodontal crown lengthening procedures were recommended for both maxillary

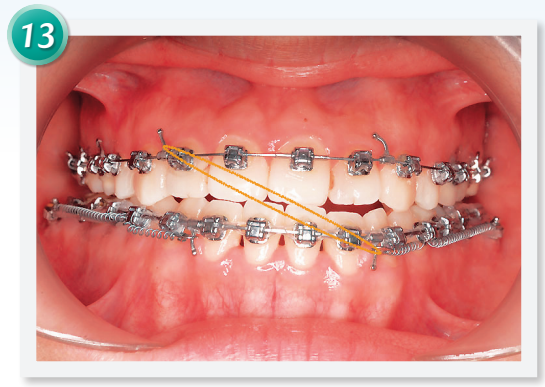


Fig. 16:
Kangaroo (3/16, 4.5oz) diagonal elastic to correct facial midline.

Fig. 17: *After two months, the facial midline was much improved.*

cuspids to improve the gummy smile and crown length-to-width ratios (*Fig. 18*).[1] The upper and lower arch-wires were changed to .014x.025" CuNiTi for final detailing. In the 23rd month of treatment, additional brackets were rebonded for final detailing. The wire sequence was: .014" CuNiTi, .014x.025" CuNiTi, .017x. 025" TMA, .019x.025" TMA, .019x.025" SS, .016" NiTi, and .014x.025" CuNiTi. After 24 months of active treatment (*Fig. 19-21*), all appliances were removed. Upper Hawley and lower spring retainers were delivered to stabilize the final result.

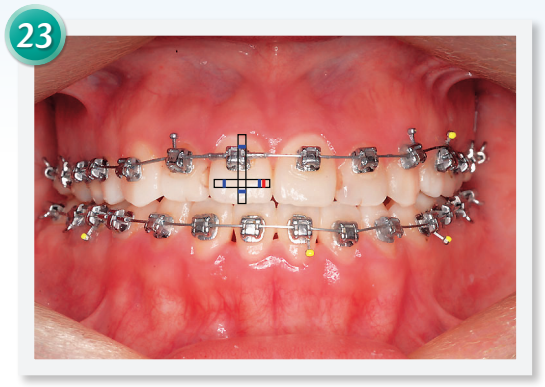


Fig. 18:
Suggest future crown lengthening of 13-23 to correct the gummy smile and to improve the crown length-to-width proportion.

Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: Retracted
- Vertical: 20 clockwise rotation of the mandibular plane angle
- Transverse: Maintained

Maxillary Dentition:

- A - P: Incisors extruded, slight lingual tipping of ~10
- Vertical: Extrusion of the entire arch
- Inter-molar / Inter-canine Width: Crowding and cross bite corrected with arch expansion

Mandibular Dentition:

- A - P: entire dentition tipped distally
- Vertical: counterclockwise rotation of mandibular occlusal plane and extrusion of incisors

Fig.19: Summary of lateral profile, intraoral photographs follow up and treatment changes.

Fig. 20: Summary of frontal profile, intraoral photographs follow up and treatment changes.

Fig. 21: Summary of 45 degrees lateral profile, intraoral photographs follow up and treatment changes.

- Inter-molar / Inter-canine Width: Maintained

Facial Esthetics:

- Upper lip retracted
- Lower lip protrusion was improved slightly.

Retention

Upper Hawley and lower spring retainers were delivered, and the patient was instructed to wear them full time for the first six months and nights only thereafter. In addition, the patient was instructed in proper home hygiene and maintenance of the retainers.

Final Evaluation Of Treatment

The ABO Cast-Radiograph Evaluation score was 25 points and IBOI Pink & White score was 4 points, as documented on the forms appearing later in this report. The major discrepancies were uneven marginal ridges (*5 points*), buccolingual inclination of posterior teeth (*9 points*), loss of some occlusal contacts (*4 points*) and inadequate root parallelism in the upper right and lower left segments (*2 points*). Most of these problems resulted primarily from the tip-back of molars in the lower arch. The OB was 2mm, OJ was 2mm, and the molar relationship were Class I bilaterally. The facial profile was acceptable. Overall, the treatment outcomes for this challenging case were pleasing for both the patient and the clinician.

Discussion

Conservative treatment of a Class III malocclusion, complicated by negative overbite and overjet, has long been challenging for orthodontists. In traditional edgewise treatment, it's quite difficult to correct severe Class III malocclusion without

extraction of lower premolars or molars. Kim's MEAW technique[2] is well known in Asia, as a powerful multiloop system for correcting anterior openbites, but it is less effective for sagittal problems. For the present patient, the diagnosis indicated passive self-ligating brackets and bone screws as anchorage for traction to retract the entire lower dentition. This method can achieve an excellent result for severe Class III malocclusions without extractions (*other than third molars*) or orthognathic surgery.[3,4] Three ways have been described for correcting Class III with bone screws: [5]

(*1*) Placing interradicular bone screws bilaterally between the upper 2nd premolars and 1st molars, and use Class III elastics. This approach requires patient compliance.

(*2*) Insert inter-radicular bone screws between the lower 2nd premolar and 1st molar, bilaterally. Due to limited interradicular space (*2-3mm*), the retraction of the entire lower dentition is limited.

(*3*) Placing bone screws in the retromolar area to retract the entire arch. Since the insertion area on the anchorage screw is behind the 2nd molar, the force application to the main archwire can be complex. Therefore the amount of arch retraction is limited and can only be used for mild Class III correction.

In this case, bone screws were place on the buccal shelf (*Fig. 10*) away from the lower molar roots, so the amount of lower arch retraction is sufficient for severe Class III correction.[3,4] Another limitation to the extent of retraction of the entire mandibular dentition is the distance between the mandibular 2nd molar and the ascending ramus.[6] Thus, the 3rd molars should be extracted before the start of orthodontic treatment to prevent them from being impacted, and to create enough space between 2nd molar and the ascending ramus. When large amounts of arch retraction are needed, the gingival hooks on molar tubes may interfere with retraction past the bone screw. [3,4] For maximum retraction, it is necessary to grind off the interfering hook on the molar tube (*Fig. 14*).

In general, molar intrusion should be avoided in Class III treatment. [4] While this concept is true for most Class III cases, the present Class III patient had a retrognathic profile and an open bite. Thus, molar intrusion is very effective mechanics (*Fig. 15*). The most important issue for non-extraction treatment of open bite with a high mandibular plane angle is the control of molar extrusion to avoid posterior rotation of mandible. However, for the present patient, modest posterior rotation of the mandible was acceptable (*Fig. 4*).

Using buccal shelf bone screw to retract the whole mandibular arch produces distal tipping of the mandibular molars. For an intrusive force in the mandibular molar region, .026x.026 (*Rocky Mountain, Co.*) rectangular elastic thread produced traction between the bone screws and the .019x.025 stainless steel main archwire, bilaterally (*Fig. 15*).[3,4] Controlling mandibular molar intrusion helped correct the open bite (*Fig. 15*) and tended to improve the retrognathic

profile. Although the open bite was corrected, the mandibular plane was rotated clockwise 2° (*Table 1*), due to distal tipping of the mandibular molars and extrusion in the maxillary arch (*Fig. 9*). The buccal shelf bone screws intruded, or at least prevented extrusion of the lower molars, but this method is only recommended for patients with an acceptable profile. If control of the mandibular plane rotation is essential, upper molar extrusion can be controlled with bone screws in the infrazygomatic crests, bilaterally.

Retracting the entire mandibular dentition with bone screws in the buccal shelves results in tip-back of the molars (*Fig. 9*).[7,8,9] The distally tipped molars contributed to the relatively high CRE score of 25 points due to poor axial inclination, marginal ridge discrepancies, and lack of intermaxillary tooth contacts. The flexibility of the arch-wire is directly proportional to the degree of distal tipping experience by the terminal molar in the arch. To avoid distally tipped mandibular molars, it would be better to retract the mandibular dentition with a stiffer archwire, such as .019x.025" SS to help prevent tip back of lower molars.[4] The counter clockwise rotation of the occlusal plane is due to the line of force of the distal traction mechanics being occlusal to the center of resistance of the mandibular dentition. It would have been helpful to have progress panoramic radiographs to recognize signs of early stages of distally tipping. The distal tipping could have been compensated by archwire adjustment or repositioning molar brackets. Unfortunately, the treatment had to end before the distal crown tipping of lower molars was corrected, due to the patient's desire to study abroad.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	84°	84°	0°
SNB°	83°	82°	1°
ANB°	1°	2°	1°
SN-MP°	46°	48°	2°
FMA°	38°	40°	2°
DENTAL ANALYSIS			
U1 TO NA mm	10 mm	9 mm	1 mm
U1 TO SN°	113°	112°	1°
L1 TO NB mm	12 mm	10mm	2 mm
L1 TO MP°	80°	73°	7°
FACIAL ANALYSIS			
E-LINE UL	-2 mm	0 mm	2mm
E-LINE LL	5 mm	3 mm	2 mm

■ Table. 1: Cephalometric summary

Conclusion

This case report presents a Class III patient with a poor prognosis for orthognathic correction: open bite, lower lip protrusion, no mento-labial sulcus and an orthognathic profile in the centric relation position. Conservative non-surgical treatment with Damon self-ligating system and buccal shelf bone screws proved to be effective for the correction of this type of Cl III malocclusion.[3,4] No airway problems, such as desribed by Kondo[10,11,12] were observed; hence, no myofunctional therapy, tongue guards, partial glossectomy, RPE or lingual holding arch

were indicated. This very difficult malocclusion (*DI = 55*) was treated to an acceptable result (*CRE = 25*). The occlusal relationship could have been improved by placing the buccal shelf bone screws earlier in the treatment sequence.

The patient was pleased to achieve a good result without any extractions except 3rd molars, orthognathic surgery, extraoral anchorage, or complex multiloop archwires. Moreover, successful management of such difficult cases with relatively simple mechanics increases the patient's confidence and trust in the clinician.

Acknowledgment

Thanks to Ms. Tzu Han Huang, Dr. Chris Chang, for proofreading this article.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 55

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 = 11

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 = 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	=	4 pts. per side	8 pts.
Beyond Class II or III	=	1 pt. per mm. additional	____ pts.

Total = 8

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 1

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

Each degree > 38° 8 x 2 pts. = 16

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = (1 pt.)

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

Total = 18

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: Trans-alveolar impaction

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

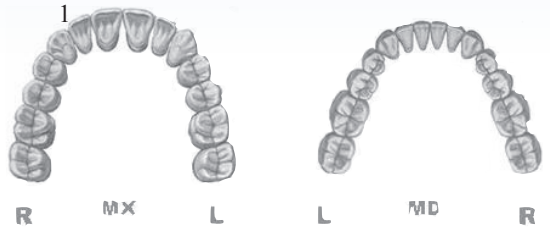
Cast-Radiograph Evaluation

Case # 1 **Patient**

Total Score: 25

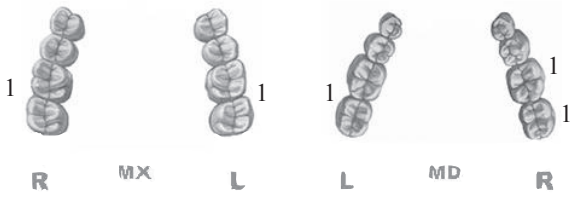
Alignment/Rotations

1



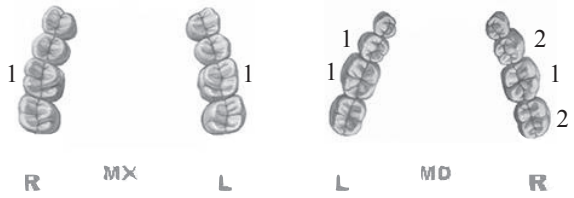
Marginal Ridges

5



Buccolingual Inclination

9

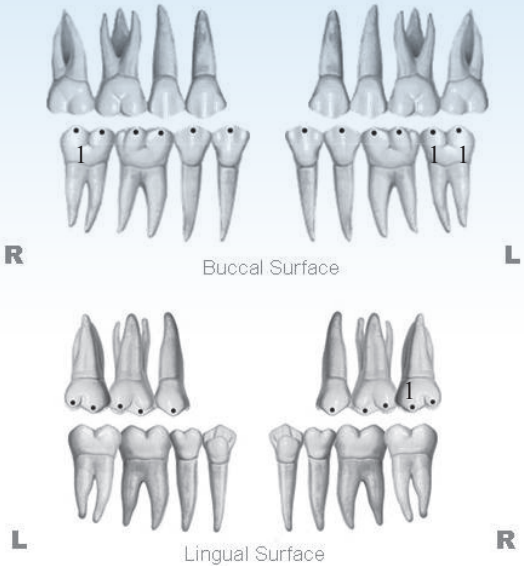


Overjet

1

Occlusal Contacts

4

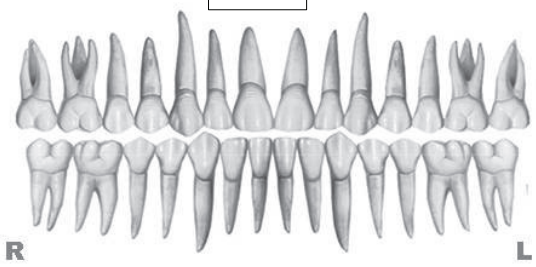


Occlusal Relationships

3

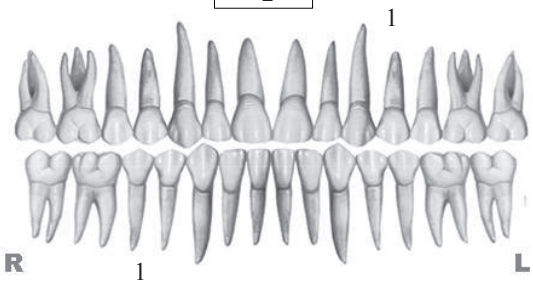
Interproximal Contacts

0



Root Angulation

2



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

IBOI Pink & White Esthetic Score

Total Score: = 4

1. Pink Esthetic Score

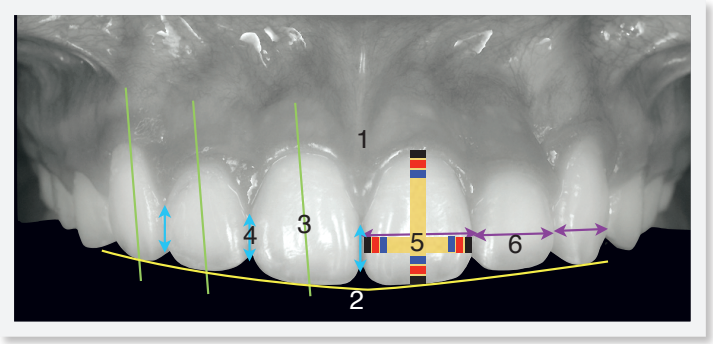
Total = 1

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)	2	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 3



1. Tooth Form	0	1	2
2. Mesial & Distal Outline	0	1	2
3. Crown Margin	0	1	2
4. Translucency (Incisal thrid)	0	1	2
5. Hue & Value (Middle third)	0	1	2
6. Tooth Proportion	0	1	2

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

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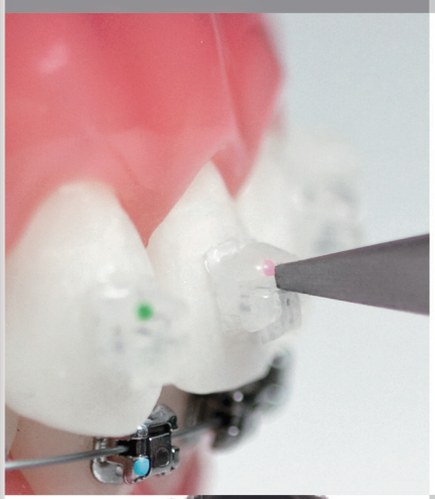

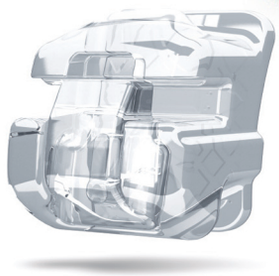

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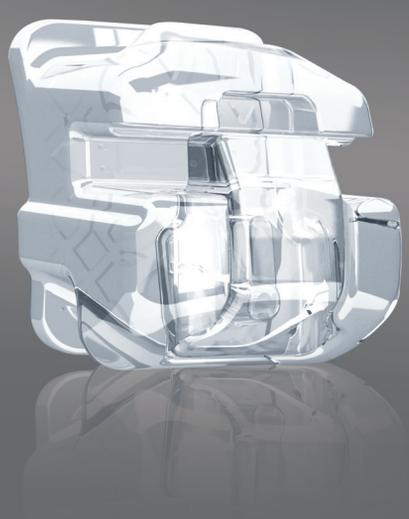

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Dear Chris:

[...] My development as lecturer and orthodontist has evolved greatly. Thanks to this great experience, I came back from Taiwan with the best and latest technique knowledge, valuable and practical tools, including how to make successful presentations using the resources of MAC technology-rightly led by you in your country. I have also received invaluable and unparalleled academic material on the proper use, benefits and applications of mini-implants.

I will always be thankful not only to you but also to your friendly and dedicated wife, your clinic team in which I found a model for organization, care and functionality. I will never forget all the attentions received and all the time spent on my professional development regardless of the multiple occupations and other responsibilities you all have[...].

Dr. Patricia Vergara Villarreal (right)
Orthodontist, the Military University.CIEO. of Bogota

Dear Chris:

I must say what I learnt these few days is possibly much more than what I learn in the past few years. You obviously had surpassed my expectation.

I learn how one could create a kingdom out of a little town; how one could manage an efficient patient flow in a shortest possible time frame with the biggest possible number; I further learn that how one should delegate the works effectively, empower the staff systematically and inspire them spontaneously to be contributory to the growth of the organization.

I also reckon that effective presentation does not depend on how flowery the language we use but on how we connect to the audience and engage their attention to our flow of thoughts. An effective presentation needs an effective tool to support the deed.

Dr. How Kim Chuan, Malaysia (middle)
President of the Malaysian Dental Association



2013 Workshop Dates: 6/18-20, 11/19-21
2012 Workshop Dates: 11/13-15

LECTURER: Dr. Chris Chang

President of the Beethoven Orthodontic Center. He received his PhD in bone physiology and Certificate in Orthodontics from Indiana University in 1996. As publisher of ***International Journal of Orthodontics & Implantology*** and author of ***3D iBooks Ortho***, he has been actively involved in the design and application of bone screws.

LECTURER: 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 chief consultant to ***International Journal of Orthodontics & Implantology***.

Day 1

13:00—14:00 Welcome Lunch
14:00—14:40 Orientation
14:40—15:00 Introduction of Beethoven Dental Group
15:00—18:30 Chair-side observation

Day 2

9:00—10:30 Optimized Orthodontic Treatment I
Dr. Chris Chang
10:30—11:00 Break
11:00—12:30 Optimized Orthodontic Treatment II
Dr. Chris Chang
12:30—13:50 Lunch
14:00—15:00 Screw Model Practice
15:00—18:30 Chair-side observation

Day 3

09:00—10:00 6 Essentials of the new Damon Q
10:00—10:10 Break
10:10—12:30 Damon + Screw Dr. John Lin
12:30—13:30 Lunch

Day 3

14:00—15:30 Introduction of Keynote: Organize your patient files for presentation
15:30—15:45 Break
15:45—17:00 Key Presentation Principles I

Day 4

09:00—10:00 Key Presentation Principles II
10:00—10:10 Break
10:10—11:30 Make it Visual
11:30—13:30 Lunch

Paradigm Shift in Class III Treatment with TADs

Introduction

Mini-implant anchorage has been proven to be an effective therapeutic strategy in treating various kinds of malocclusions.[1-13] It can be applied in many clinical orthodontic conditions successfully, including maximal retraction in protrusion cases, Class II correction, Class III correction, molar distalization in crowding cases, molar intrusion in molar elongation cases, deep bite correction, open bite correction, midline correction, and the correction of occlusal plane canting and posterior crossbite.[1-13]

Class III malocclusions are commonly found in Asian population and bimaxillary dentoalveolar protrusion is another common characteristic in oriental races. One of the critical considerations for Class III treatment is to determine whether patients' profile will become protrusive after anterior crossbite correction. If the answer is yes, then maybe extraction is a better option for treatment plan. With the help of mini-implant anchorage, Class IIII malocclusion can be treated successfully with a nonextraction approach without subsequent perioral protrusion. This paradigm shift in treatment of Class III malocclusion greatly reduces treatment duration and achieves more pleasing profile change after anterior crossbite correction.

The most common position to place mini-implants is on the upper posterior area. It is not only because

Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

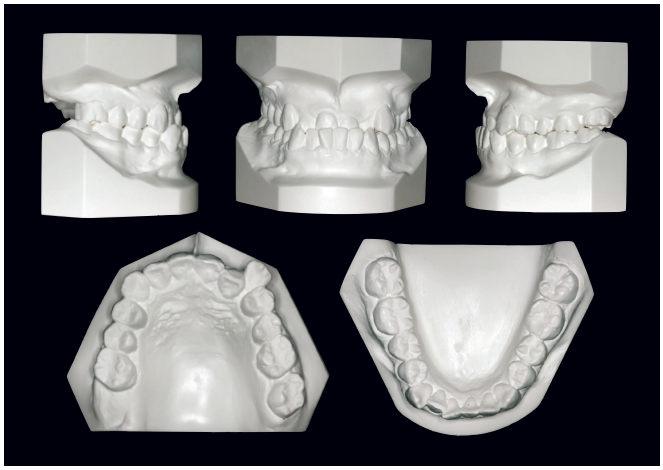

Fig. 3: Pretreatment study models

Johnny JL Liaw, Director, Beauty Forever Dental Clinic (left)
W. Eugene Robert, Consultant,
International Journal of Orthodontics & Implantology (right)

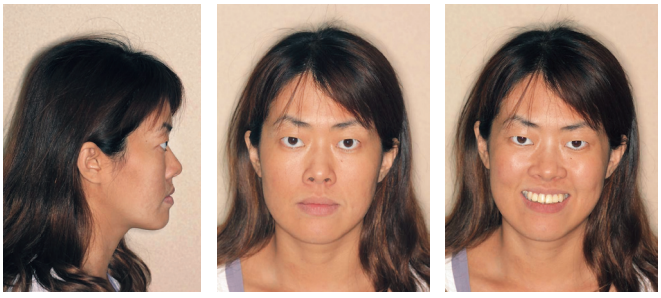

Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models

of anchorage reinforcement required in the upper arch but also more favorable anatomical situations of attached gingiva and surrounding movable mucosa.[14,15] The conventional use of mini-implant anchorage in the lower posterior area is either interdental minicrews or exo-dentitional miniplates. Interdental miniscrews are primarily for maximal anterior retraction and vertical control. Screw insertion in the attached gingival area is less skill-intensive, but not suitable for whole dentition distalization because of possible interference with root movement. Meanwhile, miniplates require two mini-screws to secure the position in the exo- dentitional bone and can be extended to the proper position for anchorage.[16,17] Whole dentition movement is no longer restrained by the mini-implant itself. However, this procedure requires a flap surgery which often causes significant patient discomfort.

In this article the authors propose an alternative use of exo-dentitional miniscrews in the mandible to treat a Class III malocclusion by full lower dentition distalization with a nonextraction approach.

History And Etiology

A 24 year old female patient requested for orthodontic treatment with the chief complaint of mandibular prognathism and anterior crossbite.

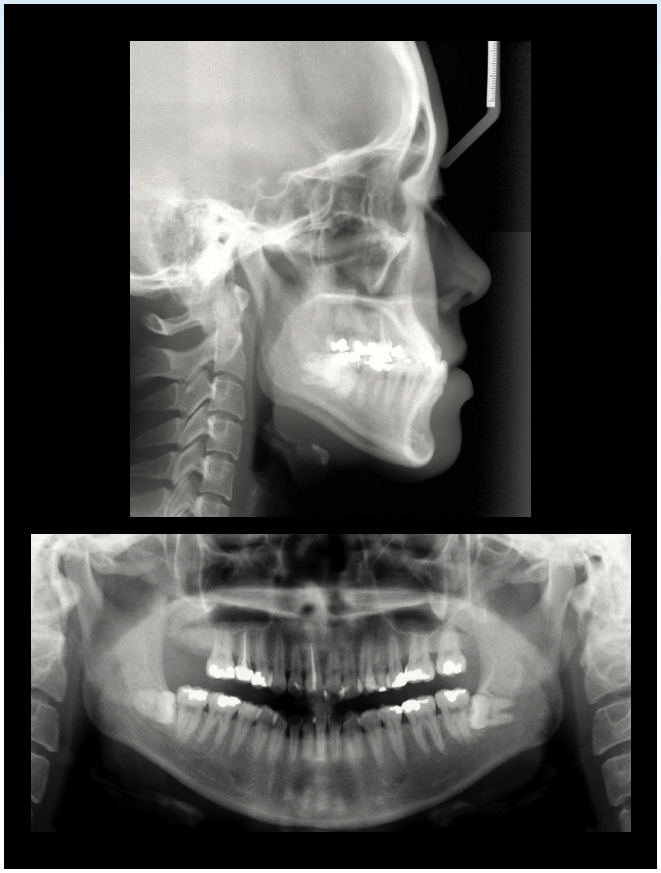

Fig. 7: Pretreatment pano and ceph radiographs

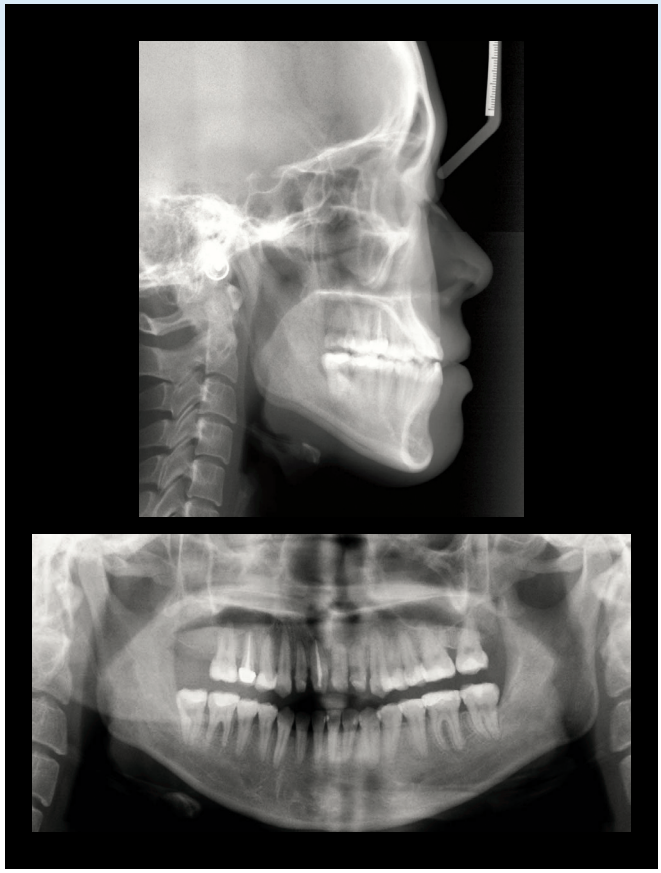

Fig. 8: Posttreatment pano and ceph radiographs

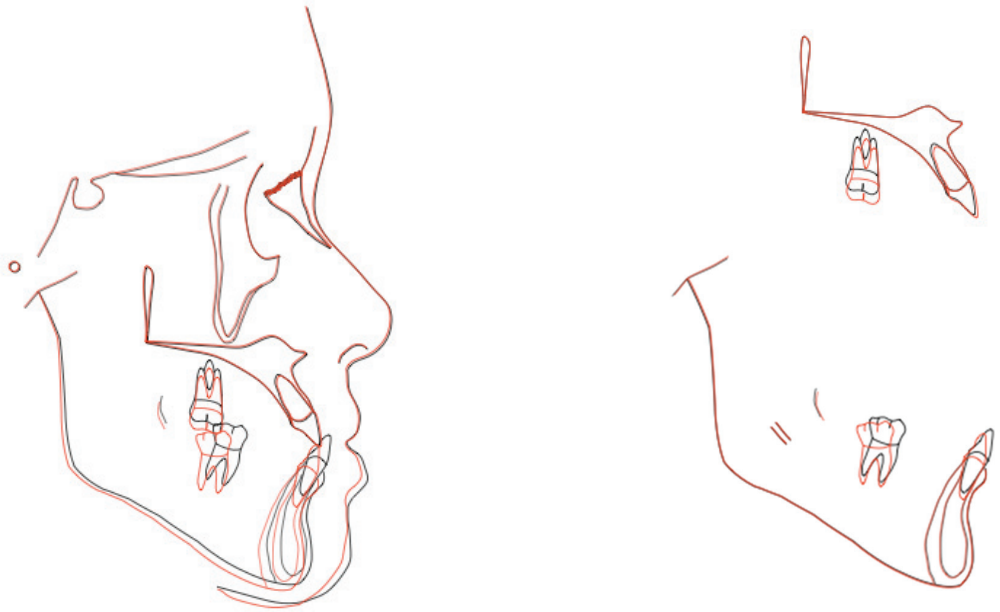

Fig. 9:

Cephalometric superimpositions showed full dentition retraction in the lower arch and the mandible rotated backward sightly so the profile became more orthognathic. The upper incisors were mildly flared out in despite of severe crowding in the upper arch. During alignment and correction of the anterior crossbite, the upper incisors were quite flared out as seen in Fig. 20 and were retracted back to nearly the original positions by the upper TADs.

Her extraoral frontal photograph showed no obvious asymmetry. Her vertical proportion was within normal limit. Upper anterior malalignment was obvious in the smiling view. The lateral view showed a concave profile because of mandibular prognathism (*Fig. 1*). Anterior crossbite and deep bite can be observed in the intraoral frontal photographs. Dental midline discrepancy was also noted. Arch length discrepancy in the upper arch was 6.5mm and 1.5mm in the lower arch. The upper right second molar was missing. Molar Class III and canine Class III relationships were noted on the right side. Molar Class I and canine Class III were noted in the left side (*Fig. 2, 3*). The panoramic X-ray showed horizontal impaction of the two lower wisdom teeth, and upper right central incisor and upper right second premolar were endodontically treated. Cephalometric X-ray revealed a skeletal Class III relationship (*ANB: -2*). Mandibular plane angle was within normal range (*SN-MP: 32*). Dental compensation for skeletal Class III was noted (*U1-SN: 113°, L1-MP: 83°*) (*Fig. 7*).

The patient reported that some family members had a prognathic jaw but it was not a common characteristic. She first noted the anterior crossbite when her permanent incisors erupted at the age of six. It was concluded that the etiology of the malocclusion was a genetic predisposition to a skeletal class III malocclusion complicated by ectopic eruption of the maxillary incisors.

This patient was treated with a nonextraction approach in conjunction with TADs. The treatment results were documented in Figs. 4-6. The pre-treatment and post-treatment radiographs were shown in Figs. 7-8. The cephalometric tracings before and after treatment are superimposed in Fig. 9.

Diagnosis

Skeletal:

- Skeletal Class III (*ANB: -2°*)
- Average mandibular plane angle (*SN-MP: 32°*)

Dental:

- Anterior crossbite
- Deep overbite
- Class III molar and canine relationships on the right
- Molar Class I and canine Class III on the left
- Endodontically treated on #11, 15
- Horizontal impactions of bilateral lower wisdom teeth

Facial:

- Concave profile with lower lip everted.

The ABO Discrepancy Index (*DI*) was 26 as shown in the subsequent worksheet.

Specific Objectives Of Treatment

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: Maintain
- Vertical: Slightly increase
- Transverse: Maintain

Maxillary Dentition:

- A - P: Slightly advance
- Vertical: Slightly increase
- Transverse: Maintain

Mandibular Dentition:

- A - P: Retract lower dentition
- Vertical: Maintain
- Transverse: Maintain

Facial Esthetics:

- Improve the facial profile by increasing the upper lip support and lower lip retraction

Treatment Plan

Two options were proposed.

Option 1: Extraction of upper second premolars, lower first premolars and lower horizontally impacted wisdom teeth.

The treatment goal for upper second premolar extraction is to relieve upper anterior crowding while extraction of lower first premolar aims to correct anterior crossbite. The proposed extraction pattern was for anchorage consideration of molar Class III correction.

Option 2: Extraction of lower horizontally impacted wisdom teeth only.

Mini-implant anchorage will be used to retract the whole lower dentition. After correction of anterior crossbite, mini-implant anchorage will be used to retract upper and lower dentition simultaneously.

After thorough discussion and communication, option 2 was accepted and reevaluation would be made after the occlusion was corrected. If the profile was too protrusive, then four bicuspids extraction would be considered as the back-up treatment plan.

As to the missing upper right second molar, implant prosthesis was proposed and was to be decided later in the treatment.

Appliances And Treatment Progress

The orthodontic treatment started after the removal of the lower wisdom teeth.

Start (*5-14-04*): After extraction of mandibular 3rd molars, the maxillary arch was bonded with Damon 2 brackets (*Ormco Corp., Orange, CA*) and the initial archwire was a .014" CuNiTi. A customized bite turbo was bonded on the lingual surface of lower left central incisor to avoid bracket interference during the initial maxillary anterior alignment (*Fig. 10*). Since there was no significant functional shift, it was necessary to open the bite for about 6mm at the incisors. The patient was instructed to pursue a soft diet until posterior occlusion was restored.

9 weeks (*7-19-04*): Mandibular arch was bonded with Damon 2 brackets and a .014" CuNiTi archwire was inserted. Two stainless steel miniscrews (*OrthoBoneScrew, Newton's A, Inc. 2x12mm*) were inserted on the buccal shelves of the mandible bilaterally. Two NiTi coil springs of 150gm were attached from the head of the miniscrews to the brackets of mandibular canines (*Fig. 11*).

12 weeks (*8-6-04*): Both archwires were changed to .016"x.025"CuNiTi.

16 weeks (*9-4-04*): The anterior crossbite was corrected to an edge-to-edge relationship. An elastic chain extended from mandibular canine to canine and bilateral NiTi coil springs were attached from the mandibular canines to the miniscrews to retract the entire mandibular dentition (*Fig. 12*).

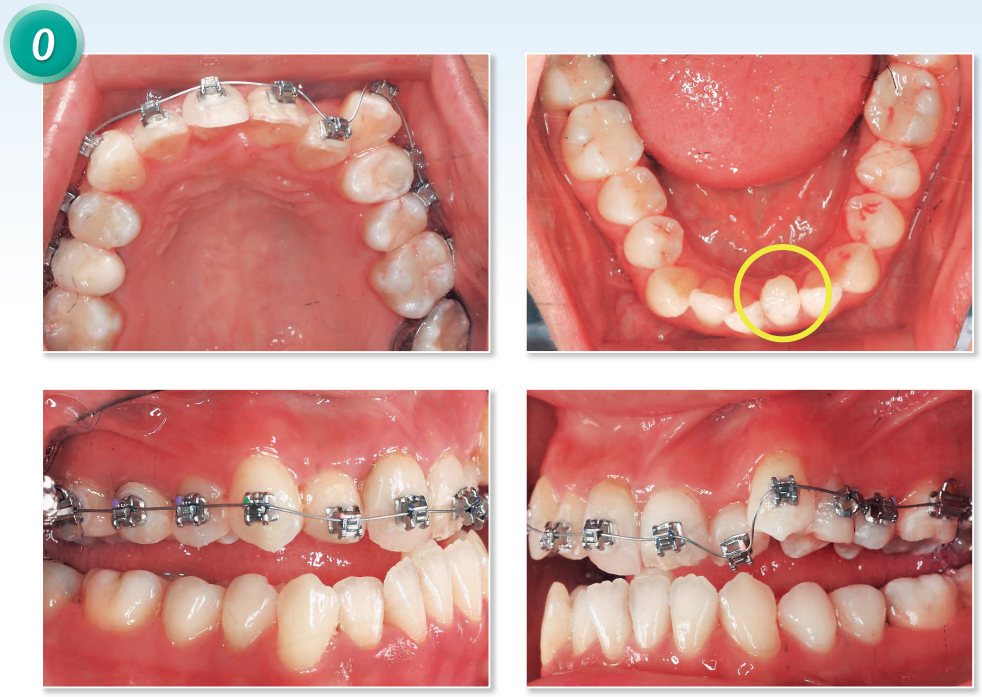

Fig. 10:

A bite turbo was bonded on the lingual surface of lower left central incisor to avoid occlusal interference with upper brackets on the first day of upper bonding.

Fig. 11:

Miniscrews were inserted on the buccal shelves of mandible for lower canine retraction.

Fig. 12:

An elastic chain extended from mandibular canine to canine and bilateral NiTi coil springs were attached from the mandibular canines to the miniscrews to retract the entire mandibular dentition.

19 weeks (*9-25-04*): Provisional crowns were fabricated for the maxillary incisors to restore asymmetric incisal wear resulting from the original malocclusion. At this stage of treatment, a positive overjet was obtained, but the canine relationships were still Class III (*Fig. 13*).

26 weeks (*11-16-04*): Class I molar and canine relationships were achieved (*Fig. 14*), but there was a bimaxillary protrusion and lip incompetence as expected (*Fig. 15*). Mandibular arch retraction was continued to position the mandibular incisors over the apical base of the symphysis and increase the positive overjet.

39 weeks (*2-16-05*): Because of the positive response to treatment, a nonextraction approach for correcting the protrusion was indicated. Bilateral miniscrews were inserted in the infrazygomatic crests to retract the entire maxillary dentition with chains of elastomers (*Fig. 16*).

47 weeks (*4-13-05*): The archwires were sectioned distal to the upper lateral incisors and lower canines and the posterior segments were removed. Continuous intermaxillary elastics (*Ostrich, Ormco Corp.*) were prescribed to settle the posterior occlusion (*Fig. 17*).

50 weeks (*5-04-05*): Active treatment was completed, and all brackets, bands and miniscrews were removed (*Figs. 4-6*).

Results Achieved

The treatment duration was 50 weeks. Two CuNiTi archwires were used in each arch: a .014" round wire followed by a .016"x.025" rectangular wire. The anterior crossbite and asymmetric Class III

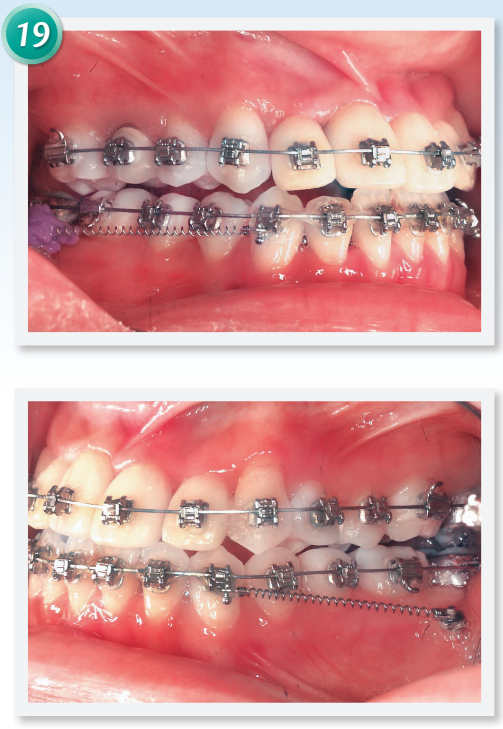

Fig. 13:

Positive overjet was obtained after some retraction of lower dentition and provisional crowns fabrication of upper incisors. However, the canine relationships remained to be Class III.

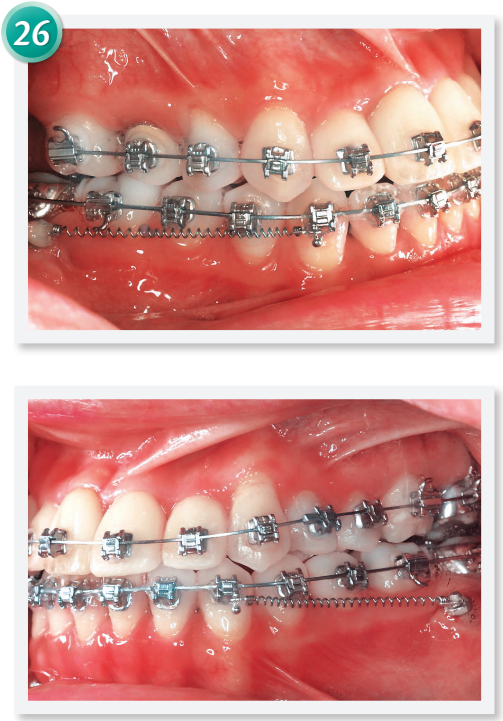

Fig. 14:

Class I canine and molar relationships were achieved after 6 months of treatment.

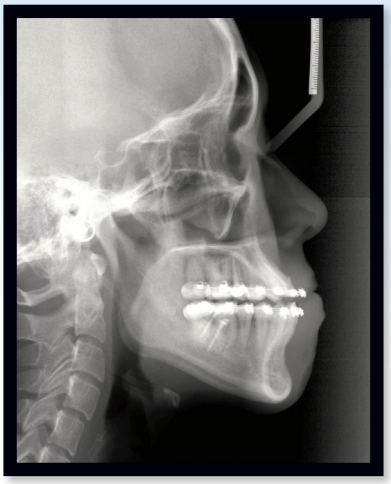

Fig. 15:

Bimaxillary protrusion was noted after the correction of anterior crossbite.

buccal relationships were corrected (*Figs. 5-6*), and a pleasing, more orthognathic profile was achieved (*Fig. 4*). The post-treatment panoramic radiograph documents normal root parallelism and good maintenance of supporting alveolar bone (*Fig. 8*). The mandibular right 2nd molar was excessively tipped distally as the dentition was retracted; additional treatment was not needed because extraction of the unopposed tooth was planned.

The post-treatment cephalogram documents an acceptable orthognathic profile, but the ANB angle improved to only -2°. The skeletal response was typical for a camouflage treatment of a Class III skeletal malocclusion: increased vertical dimension of occlusion, flaring of the maxillary incisors and decreased inclination of the mandibular incisors. Accordingly, the cephalometric analysis showed that the mandibular plane angle was increased ~10 (*Tab. 1*). Clockwise mandibular rotation was noted in the cephalometric superimposition (*Fig. 9*). Consistent with camouflage treatment, the axial inclination of the maxillary incisors increased and the mandibular incisors decreased (*Tab. 1*).

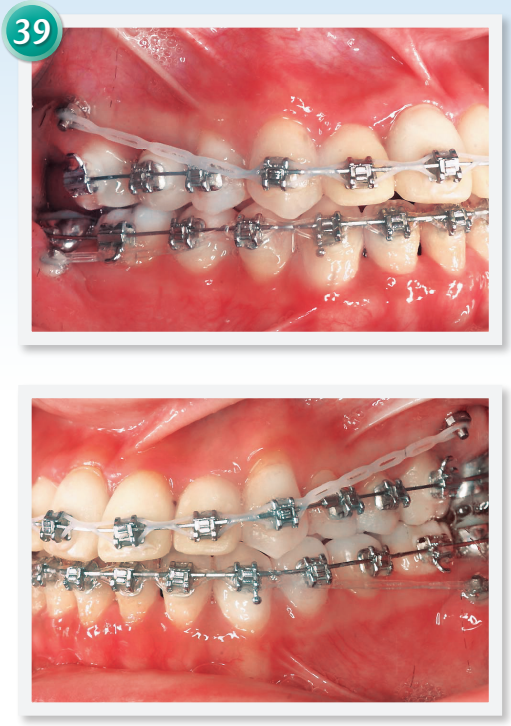

Fig. 16:

Two miniscrews were installed on the upper posterior areas, in conjunction with the miniscrews on bilateral buccal shelves, to retract both arches simultaneously.

Fig. 17:

The archwires were cut distal to the upper lateral incisors and lower canines. The posterior segments were removed. Up-and -down finishing elastics were prescribed to settle the occlusion.

Fig. 18:

Serial photographs during treatment:

A. Profile before treatment.

B. Profile in the 6th month of treatment when the anterior crossbite was just corrected.

C. Profile in the 8th month of treatment after upper TADs were placed.

D. Profile after treatment.

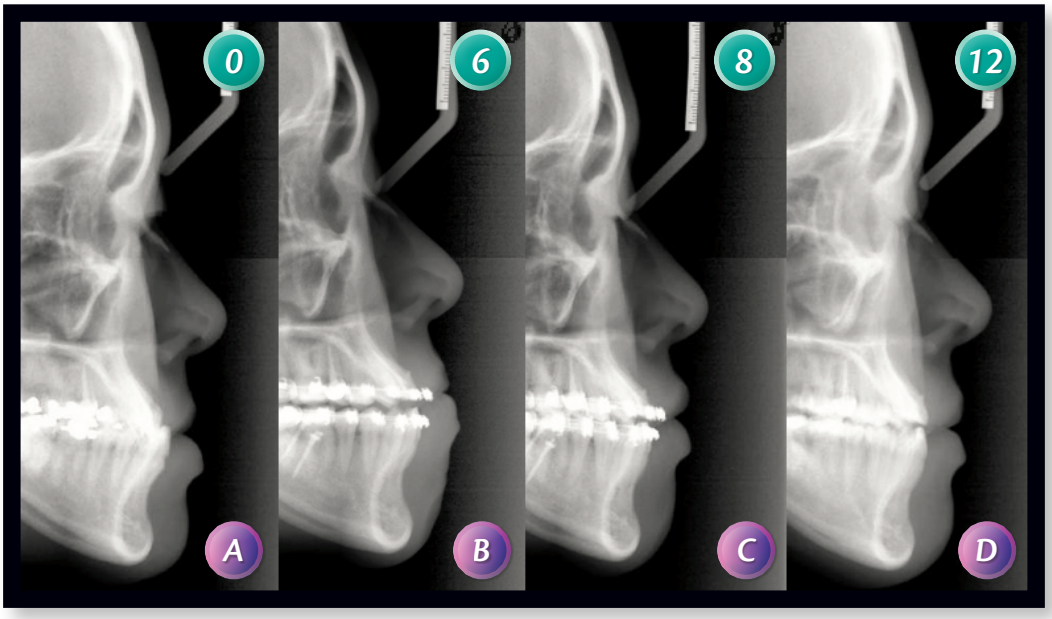

Fig. 19:

Corresponding serial radiographs.

A. Pre-treatment cephalogram.

B. Cephalogram in the 6th month when the anterior crossbite was just corrected.

C. Cephalogram in the 8th month after upper TADs were inserted.

D. Post-treatment cephalogram.

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition:

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

Mandibular Dentition:

- A - P: Lower dentition retracted
- Vertical: Maintained
- Transverse: Maintained

Facial Esthetics:

- Improved by increasing upper lip support and retracting lower lip

Retention

Upper and lower clear retainers were delivered, and the patient was instructed to wear the retainers full time for first 6 months and night time only thereafter. The retainers were renewed after the permanent prosthesis were fabricated. Seven-year post-treatment records of the present patient show satisfactory stability (*Figs 22, 23*).

Final Evaluation Of Treatment

The ABO Cast-Radiograph Evaluation score was 11 points. The major discrepancies were in the left occlusal relationships, alignment/rotation, and marginal ridges. It was mainly contributed to the space regaining for block-out canine. More distal root movements were needed to upright the root angulations of upper left posterior teeth, which will consequently improve the occlusal contacts at the distal parts of the dentitions.

Discussion

The post-treatment cephalogram looks more orthognathic profile, but the ANB angle is still -2˚. The mandibular plane angle was increased from

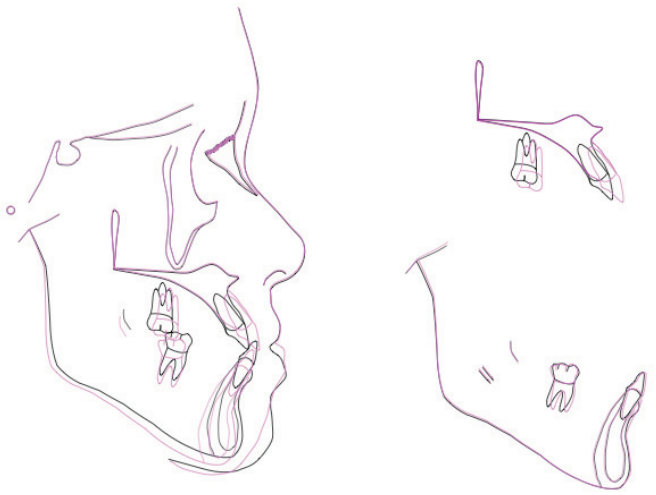

Fig. 20:

The superimpositions of the Pre-treatment and the 6th month cephalograms showed the upper incisors were significantly flared out after anterior crossbite was corrected. The profile became more protrusive after the correction of the anterior crossbite.

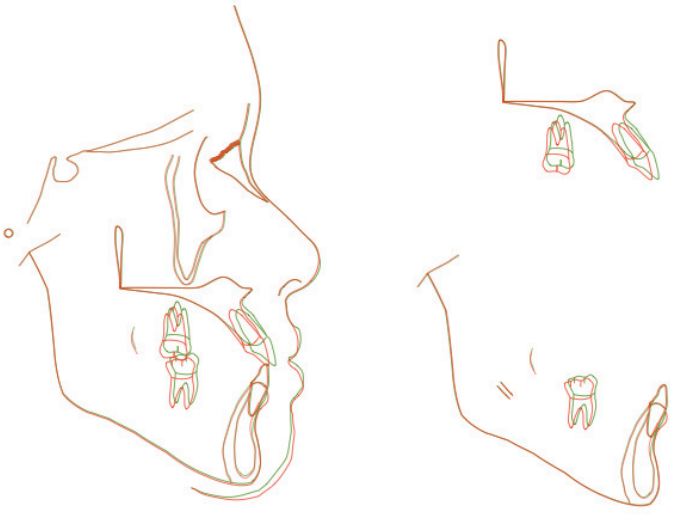

Fig. 21:

The superimpositions of the 8th month and post-treatment cephalograms showed both dentitions were retracted by TADs to correct the mid-treatment protrusion.

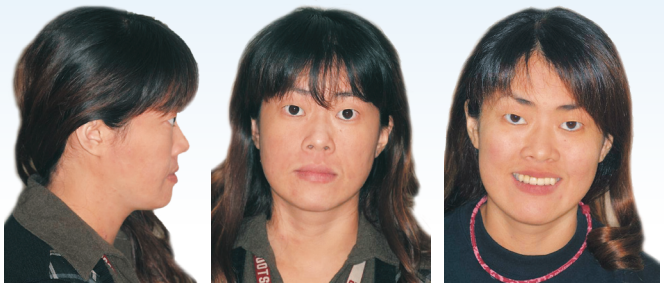

Fig. 22: Seven-year posttreatment facial photographs

Fig. 23: Seven-year posttreatment intraoral photographs

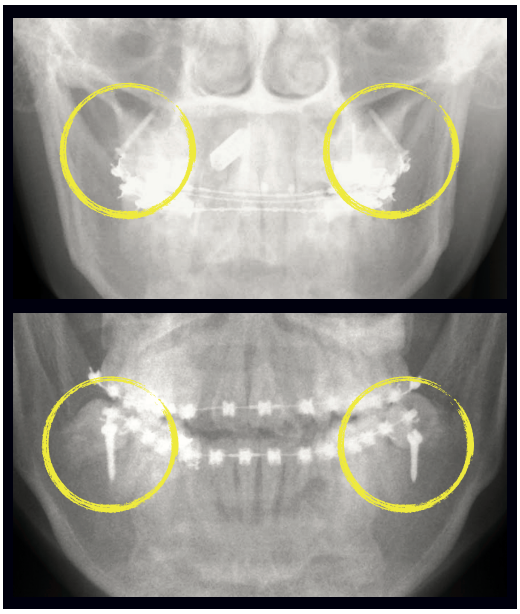

Fig. 24:

Exo-dentitional positions of the miniscrews were critical to the success of this treatment approach.

32˚ to 33˚.(*Tab. 1*) Clockwise mandibular rotation was noted in cephalometric superimposition. The upper incisors were slightly proclined without too much advancement. (*U1-SN: from 113˚ to 116˚*) The lower dentition were en masse distalized. The lower incisors became more retroclined inevitably. (*L1-MP: from 83˚ to 77˚*)(*Tab. 1*) The overall superimposition can hardly show the true value of this treatment modality. The serial photographs (*Fig. 18*) and the corresponding serial cephalograms (*Fig. 19*) better indicate the significant effects of mini-implant anchorage. In a camouflage treatment of Class III malocclusion, the lower arch is usually the limiting factor of the treatment result. It's more difficult to distalize lower dentition than advance upper dentition to correct the negative overjet. Therefore, it is common to see overly proclined upper incisors

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	86°	84°	2°
SNB°	88°	86°	2°
ANB°	-2°	-2°	0°
SN-MP°	32°	33°	1°
FMA°	26.5°	27.5°	1°
DENTAL ANALYSIS			
U1 TO NA mm	6 mm	9 mm	3 mm
U1 TO SN°	113°	116°	3°
L1 TO NB mm	7.5 mm	4.5 mm	3 mm
L1 TO MP°	83°	77°	6°
FACIAL ANALYSIS			
E-LINE UL	-5 mm	-4.5 mm	0.5 mm
E-LINE LL	1 mm	0 mm	1 mm

Table. 1: Cephalometric summary

combined with excessively retroclined lower incisors after a Class III camouflage treatment. In addition, the posttreatment profile tends to seem protrusive. If whole distalization of lower dentition with the miniscrews can be achieved during treatment, the excessive advancement of upper incisors can be avoided and the posttreatment profile may appear less protrusive. In this case, even with lower miniscrews, upper incisors advancement was still more significant than lower incisors distalization (*Fig. 20*). The profile remained protrusive after anterior crossbite correction. Another two miniscrews were then placed in the infrazygomatic crest to distalize the whole upper dentition and finally, a more orthognathic posttreatment profile was achieved (*Fig. 21*).

Treatment result of this case can be obtained either by four bicuspids extraction or by nonextraction treatment supported with mini-implant anchorage.[18] The treatment time is reduced to 12 months with the nonextraction approach and mini-implant anchorage. Nonextraction treatment of some Class III malocclusion with mini-implant anchorage is not only conservative but also efficient. The criteria of the cases election for this approach is basically the same with camouflage treatment of Class III treatment. That is

1) mild to moderate skeletal discrepancy
2) no or less dental compensation
3) acceptable profile except perioral imbalance
4) the last but not the least, clearance for whole dentition distalization. Wisdom teeth should be removed, the skeletal boundaries of dentition should be verified carefully by radiographs and soft tissue boundaries of dentition should be observed clinically.

The positions of the miniscrews are exo-dentitional, not in the interdental area (*Fig. 24*). This is critical in this nonextraction approach so that the miniscrews will not come in contact with the moving dentitions. The insertion points of the miniscrews on the maxilla is the attached gingival area of upper molars ranging from the mesial to distal interdental area of upper first molars. Initially the miniscrews was inserted perpendicular to the bony surface. After initial engagement of the cortical bone, the miniscrews were redirected to about 60 degrees to the occlusal plane to avoid the roots and aimed at the infrazygomatic crest. The implant sites on the mandible are the buccal shelves between the lower first and second molars. The selection of insertion point depends on patients' individual anatomy. The flatter platform of the buccal shelves and the more attached gingiva are the favorable factors to insert a miniscrew. The direction of miniscrew insertion on buccal shelves is perpendicular to the platform and insert all the way until proper amount of head exposure. The insertion technique of miniscrews is quite simple and safe. It needs only local infiltration of analgesia. No flap or pilot drilling is needed, even on the buccal shelves of the mandible. Screwdriver is the only tool needed to insert the miniscrews.

Bite turbo used at initial stage of this treatment can not only prevent the occlusal interference with the upper brackets, but also help intrude lower incisors and the extrude the upper posterior teeth, which subsequently rotated the mandible backward slightly.

The "*Lip bumper effect*" claimed by the Damon bracket system was not obvious in preventing the incisors from flaring out. The success of this treatment relies more on the mini-implant anchorage than the chosen bracket system.

Conclusions

Treatment of anterior crossbite in Class III malocclusions with a nonextraction approach often results in protrusive profiles and flared upper incisors. With the help of TADs, distalization of the entire lower dentition can be achieved to correct the Class III relationship without excessive procumbency of the upper incisors. Consequentially, the profile could be improved without premolar extraction. The exo-dentitional position of the miniscrews is critical for the success of this treatment approach in whole dentition distalization. In terms of treatment effects, miniscrews are as efficacious as miniplates in whole dentition distalization.

Acknowledgment

Thanks to Ms. Tzu Han Huang for proofreading this article.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 26

OVERJET

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

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

Total = 9

OVERBITE

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

Total = 2

ANTERIOR OPEN BITE

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

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 2

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 4

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 = 2

Total = 26

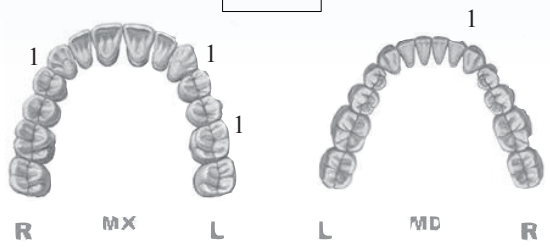
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 11

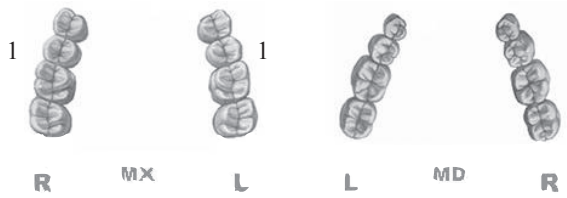
Alignment/Rotations

4



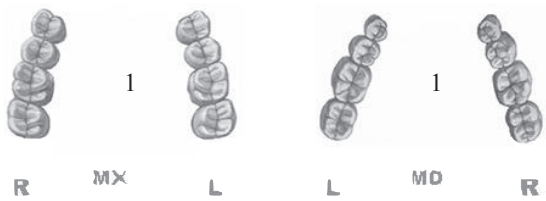
Marginal Ridges

2



Buccolingual Inclination

2

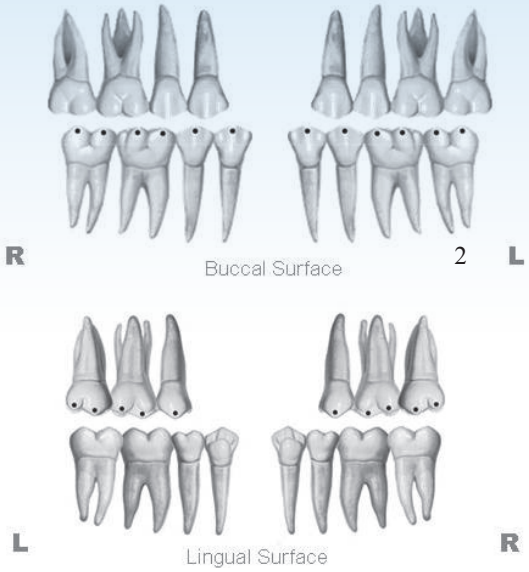


Overjet

0

Occlusal Contacts

2

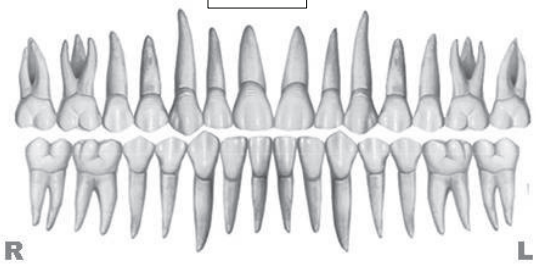


Occlusal Relationships

0

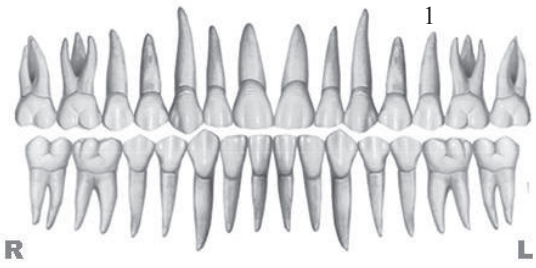
Interproximal Contacts

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.

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Recommend

藍明賢

法國的Dr.Didier Fillion. 它不僅是歐洲舌側矯正界的先驅,更是世界舌側矯正界的教父級人物,10多年前Dr.Fillion曾來台授課,他的大師風範,簡明扼要,淺顯易懂的教學內容,啟迪了我們這一個世代,鼓舞了我們勇敢地投身於舌側矯正的領域,10多年後,他將再度來台,對我們而言,不僅是對過往數十寒暑努力的總驗證,更期待能學習他近十年所累積更上層的功力,而對初入門的醫師而言,更是絕佳的機會,因為唯有在大師的指引下,才可避免走向不必要的冤枉路,而藉由吸取大師數十年的精華,並努力學習,就會像站在巨人的肩膀上一般,可以看得更高更遠.

主辦單位: 臺灣舌側矯正研討會&台灣楓城牙友學會

協辦單位: 湧傑企業股份有限公司

時間地點: 2013-02-03周日Lecture-臺大兒童醫院B1視聽講堂

2013-02-04周一Hands-on-臺大牙科學生實驗室

lecture+Hands-on：開放30名即日起預約,額滿為止

收　　費: 會員28,000元 早鳥價 25,000

非會員33,000元 早鳥價 30,000

學生23,000元 早鳥價 20,000(限5名)

(費用含課程講義及材料,矯正器械須自備)

聯絡人藍明賢0955309108 FAX:02-87123004

e-mail:orthoblue@yahoo.com.tw

聯絡人邵美珍02-27788315分機120

繳費帳戶:中華郵政劃撥帳號:50123385 戶名:陳建舜

台灣舌側矯正研討會年費:

舊會員5000元整,新會員15000元整(含入會費10000)

Combined Implant-Orthodontic Treatment for an Acquired Partially-Edentulous Malocclusion with Bimaxillary Protrusion

History and Etiology

A 31-years-old female presented for a full mouth evaluation (*Fig. 1*). Her chief concerns were bimaxillary protrusion, multiple caries, and edentulous spaces (*Figs. 2, 3*). There were no contributory medical problems. Clinical exam revealed a complex acquired malocclusion. There was a bimaxillary protrusion of the anterior segments, as well as edentulous spaces for missing maxillary right 1st molar, left 1st and 2nd premolar. Two residual root tips were noted in the maxillary right and left 1st molar areas. Deep caries were diagnosed in the mandibular right 1st premolar and 2nd molar. There were horizontally impacted mandibular third molars bilaterally (*Fig. 2*). The patient was treated to an acceptable result as documented photographically in Figs. 4-9. The cephalometric and panoramic radiographs document the pre-treatment condition (*Fig. 7*) and the post-treatment results (*Fig. 8*). The superimposed cephalometric tracings before and after treatment are shown in Fig. 9.

Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

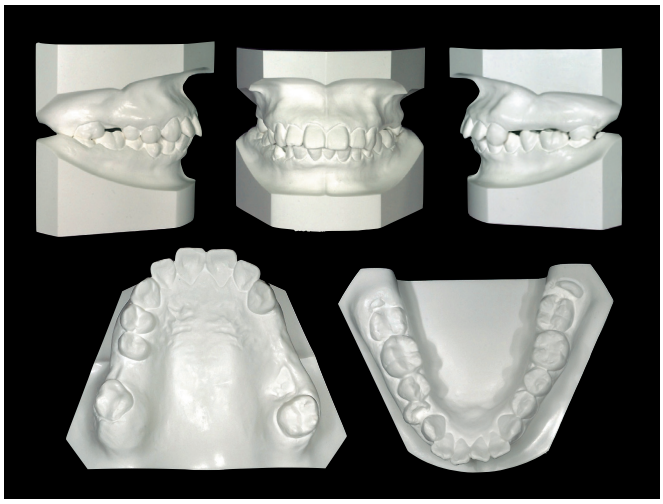

Fig. 3: Pretreatment study models

Diagnosis

Skeletal:

- Skeletal Class II (*SNA 83.5°, SNB 76.5°, ANB 7°*)
- Hyperdivergent: increased mandibular plane angle (*SN-MP 42°, FMA 35°*)

Dr. Ming-Jen Chang, Lecturer, Beethoven Orthodontic Course (right)
Dr. Chris HN Chang, Director, Beethoven Orthodontic Center (middle)
Dr. Eugene W. Roberts, Consultant,
International Journal of Orthodontics & Implantology (left)

Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models

Dental:

- Class II molar (*mutilated*), dentally compensated Class II malocclusion
- Right canine Class II, left canine Class I
- Bimaxillary protrusion of anterior segments
- Edentulous areas: maxillary right 1st molar, left 1st and 2nd premolar
- Residual roots retained in the maxillary right and left 1st molar areas
- Deep caries in the mandibular right 1st premolar and 2nd molar
- Horizontally impacted mandibular third molars, bilaterally

Facial:

- Bimaxillary protrusion with lip strain

The ABO Discrepancy Index (*DI*) was 43, with 4 more points added for deficient implant sites, as is shown in the subsequent worksheet.

Specific Objectives Of Treatment

Maxilla (*all three planes*):

- A - P: Retraction
- Vertical: Maintain
- Transverse: Maintain

Mandible (*all three planes*):

- A - P: Retraction
- Vertical: Maintain
- Transverse: Maintain

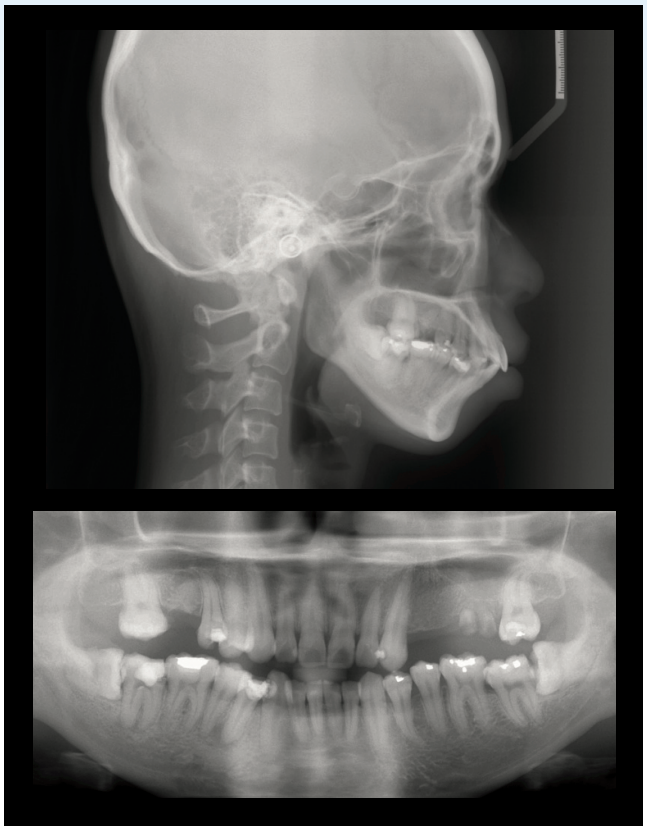

Fig. 7: Pretreatment pano and ceph radiographs

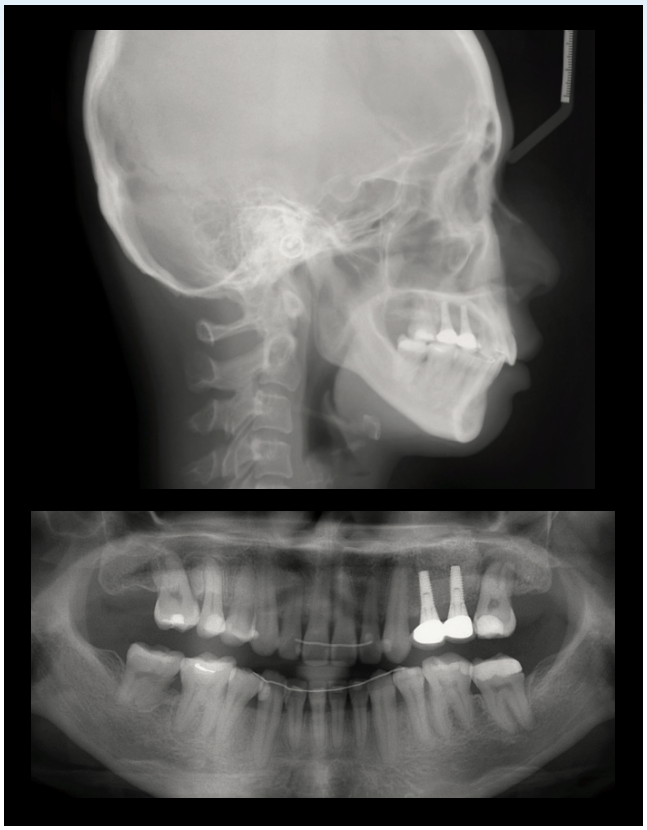

Fig. 8: Posttreatment pano and ceph radiographs

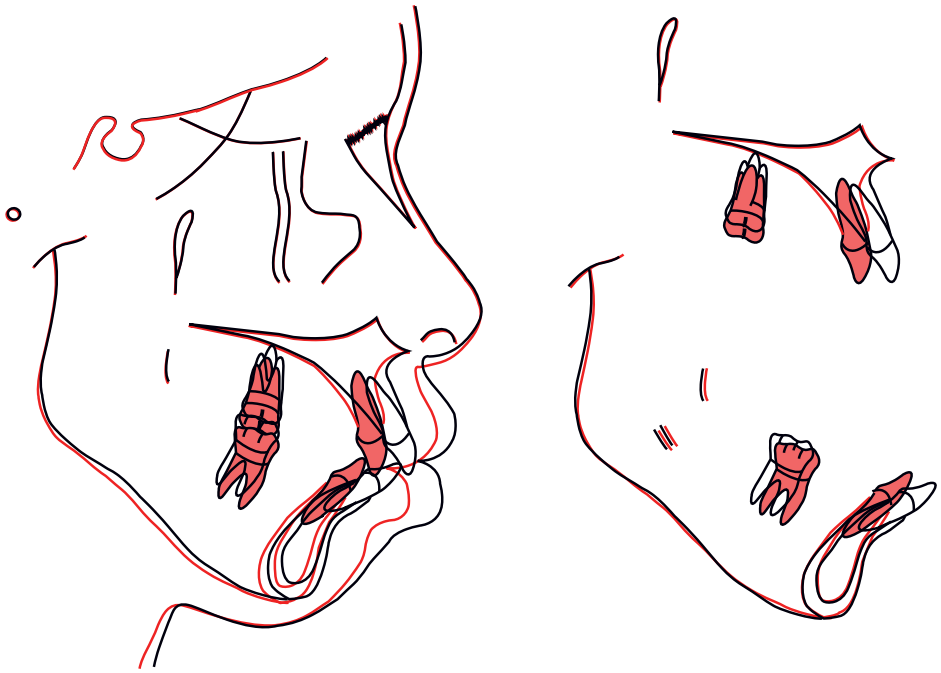

Fig. 9:

Superimposed tracings indicate that the upper anterior teeth were retracted and the molars were extruded. In addition, the lower anterior teeth were retracted and intruded while the molars were intruded and moved forward.

Maxillary Dentition

- A - P: Retract incisors and protract posterior segment
- Vertical: Maintain
- Inter-molar Width: Maintain

Mandibular Dentition

- A - P: Retract incisors
- Vertical: Maintain
- Inter-molar / Inter-canine Width: Round out the arch over the apical base of bone

Facial Esthetics: Retract upper and lower lips to enhance facial esthetics and lip competence.

Treatment Plan

- Multiple extractions: 1. residual roots of the upper right and left 1st molars, 2. lower right and left 1st premolars, and 3. right 2nd molar (*Fig. 10*)
- Orthodontic bone screws to assist in correction of maxillary anterior protrusion
- Retract incisors and close spaces with closed coil springs
- Retain an edentulous site in the upper left 1st and 2nd premolar areas to accommodate two implants (*Fig. 8*)
- Anterior bite turbos to intrude lower incisors as they are retracted
- Class II elastics to resolve the Class II occlusion
- Detailed bending and settling elastics to produce the final occlusion
- Sinus-lift bone graft to augment available bone height in the left posterior maxilla

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	83.5°	81°	2.5°
SNB°	76.5°	76°	0.5°
ANB°	7°	5°	2°
SN-MP°	42°	41°	1°
FMA°	35°	35°	1°
DENTAL ANALYSIS			
U1 TO NA mm	6.0 mm	-1 mm	7 mm
U1 TO SN°	107°	93.5°	13.5°
L1 TO NB mm	13.0 mm	7 mm	6 mm
L1 TO MP°	113.5°	97°	16.5°
FACIAL ANALYSIS			
E-LINE UL	7 mm	2 mm	5 mm
E-LINE LL	10 mm	3 mm	7 mm

Table. Cephalometric summary

Fig. 10:

The upper right and left 1st molar's residual roots, the lower right and left 1st premolar and right 2nd molar were extracted.

Fig. 11:

The maxillary arch was bonded with high torque brackets in the anterior. segment.

Fig. 12:

The mandibular arch was bonded with high torque brackets.

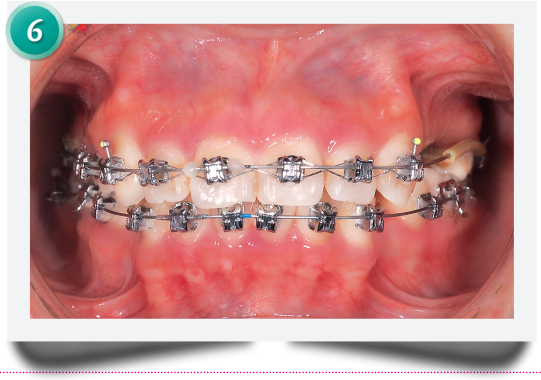

Fig. 13:

The archwire was changed to a .017x.025 low friction TMA® wire in the upper arch and a .016 CuNiTi wire was placed in the lower arch. The maxillary anterior segment was ligated with a figure-eight tie of a .012" stainless steel ligature.

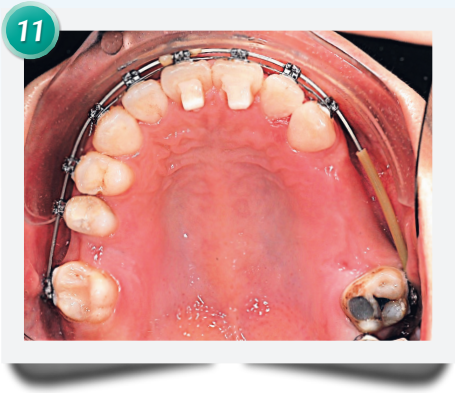

Fig. 14:

The anterior bite turbos were placed on the palatal side of maxillary central incisors to correct anterior deep bite.

- Place two implants in upper left premolar area to restore occlusal function
- Retention: 1. maxillary fixed retainer from right lateral incisor to left lateral incisor, and 2. mandibular fixed retainer from right canine to left canine, and 3. clear overlay retainers for both arches.

Appliances And Treatment Progress

The .022" slot Damon D3MX bracket system (*Ormco*) was used. The maxillary arch was bonded with high torque brackets in the anterior segment, and a .014 CuNiTi archwire was inserted (*Fig. 11*). Four months later, it was replaced with a .014x.025 NiTi archwire. After three months of initial alignment and leveling, the mandibular arch was bonded with high torque brackets and fitted with a .014 CuNiTi archwire (*Fig. 12*).

In the 6th month of the treatment, the archwires were changed to .017x.025 low friction TMA® in

the upper arch and a .016 CuNiTi in the lower arch. At the same appointment, the maxillary anterior segment was ligated with a figure-eight tie of an .012" stainless steel ligature (*Fig. 13*). Two months later the lower archwire was replaced with .014x.025 NiTi. Three months later, anterior bite turbos were placed on the palatal side of maxillary central incisors to intrude the mandibular incisors (*Fig. 14*). Class II elastics were used, from the upper canines to lower 1st molars bilaterally, to resolve the sagittal discrepancy. In the 12th month, a .019x.025 stainless steel archwire was placed on the upper arch and a .017x.025 low friction TMA was used in the lower arch. During the treatment period, the lower right 3rd molar erupted into the space of the previously extracted 2nd molar. It was bonded, and the .017x.025 low fiction TMA® archwire was extended therough the bracket to align the lower right 3rd molar (*Fig. 15*). One month later, the lower archwire was replaced with .019x.025 stainless steel, and the anterior segment was ligated with a figure-eight tie of an .012" stainless steel ligature. At the same appointment, four closed coil NiTi springs were inserted from canine to 1st molar in each quadrant, to close the edentulous spaces as prescribed (*Fig. 16*). In the 18th month, two bone screws (*2x12mm OrthoBoneScrew, Newton's A, Inc.*) were inserted into both infrazygomatic crests, and two closed coil springs (*8mm, 200g*) were attached, from upper right and left canines to the bone screws, bilaterally (*Fig. 17*).

In the 25th month, a panoramic radiograph was used to evaluate bracket positions and the spaces

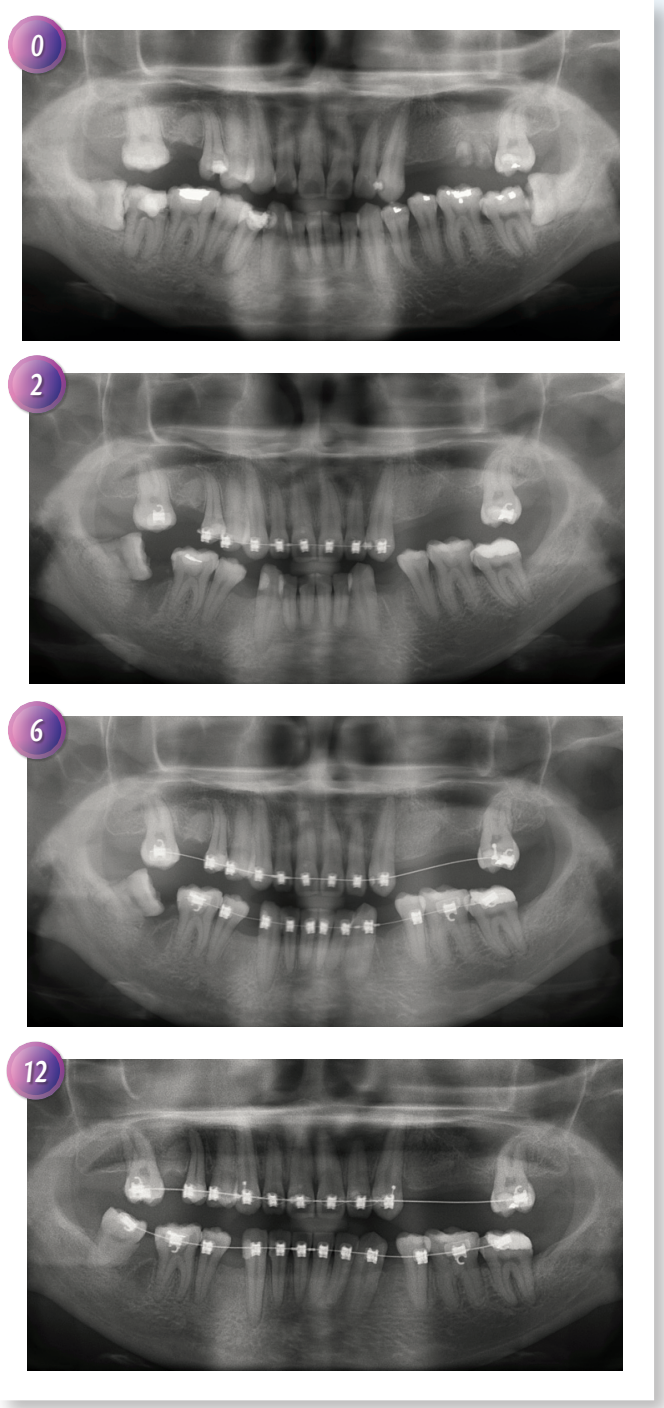

Fig. 15:

The lower right 3rd molar erupted into the space of the previously extracted 2nd molar. The changed low fiction TMA® archwire was extended to the lower right 3rd molar to align the dentition.

Fig. 16:

The closed coil springs were used to close the edentulous spaces.

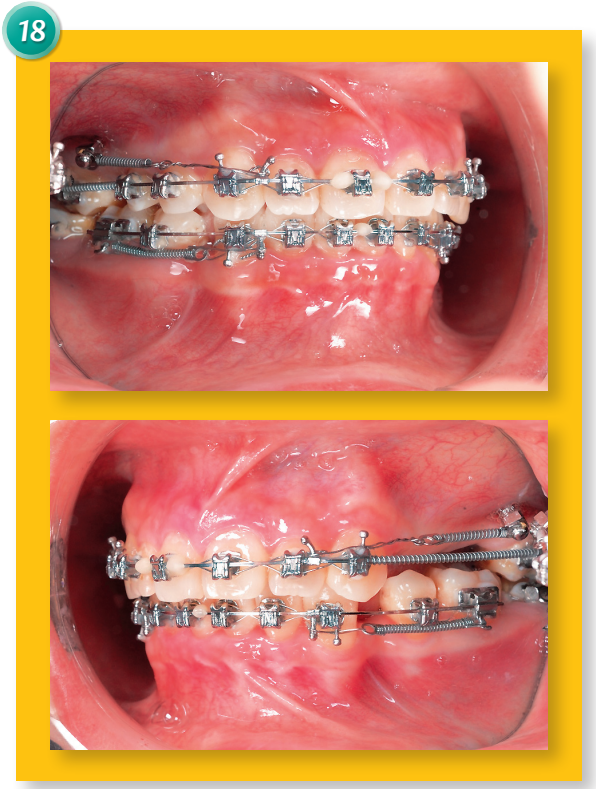

Fig. 17:

There were two closed coil springs attached from upper right and left canines to the bone screws.

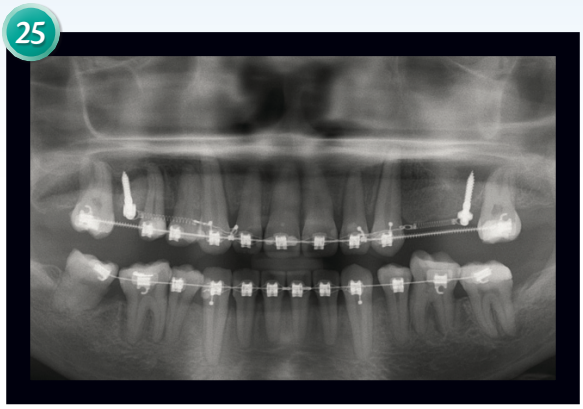

Fig. 18:

The panoramic radiograph was taken to evaluate bracket positions and the spaces for implants.

Fig. 19:

There were two buttons bonded on the palatal side of upper right 1st premolar and 2nd molar and attached with enforced power chains for closing the edentulous space. There was a space about 16.5mm over upper left 1st premolar and 2nd premolar area for implants.

for the implants (*Fig. 18*). Multiple brackets were repositioned, as needed to correct axial inclinations in the buccal segments. Also the lower left 1st molar bracket was repositioned to increase the vertical occlusal space for the planned implants.

After 34 months, a small extraction space of upper right 1st molar remained. Two buttons were bonded

Fig. 20:

There was not enough vertical space for upper side implantation. A bone screw was inserted in the upper left 2nd premolar site and restored with glass ionomer cement to help intruded supra-erupted lower left 1st molar. At the same time, the lingual cusp of lower left 1st molar was reduced to get more space for the upper implantation.

on the palatal side of upper right 1st premolar and 2nd molar. Power chains were attached between the buttons to close the space. Meanwhile, a space of 16.5mm in the upper left 1st premolar and 2nd premolar area was preserved for implants (*Fig. 19*).

In the 37th month, insufficient vertical space was available for upper left implants. A bone screw, with its head covered in glass ionomer cement, was inserted in middle of the upper left 2nd premolar ridge to provide an occlusal stop to help intrude the supra-erupted lower left 1st molar. At the same appointment, the lingual cusp of lower left 1st molar was reduced to create more space for the upper implant-supported restoration (*Fig. 20*). In the 39th month, the obstacle soft tissue between upper right 1st premolar and 2nd molar was removed with a diode laser (*Fig. 21*), and the space was closed.

After 42 months of active treatment, all appliances were removed. The preprosthetic dentition was retained with fixed anterior retainers in both arches: maxillary right lateral incisor to left lateral incisor, and mandibular right canine to left canine (*Fig. 22*). Clear overlay retainers were delivered for both arches.

Implant placement procedure

When placing implants a surgical stent is recommended to guide the precise positioning and angulation of the drill (*Fig. 23*). After a prolonged period of tooth loss, the alveolar ridge became atrophic and had insufficient bone height for implantation. Conebeam CT images demonstrate

Fig.21:
The diode laser was used to remove the obstacle soft tissue.

Fig. 22:
The corrected dentition was retained with fixed anterior retainers on both arches.

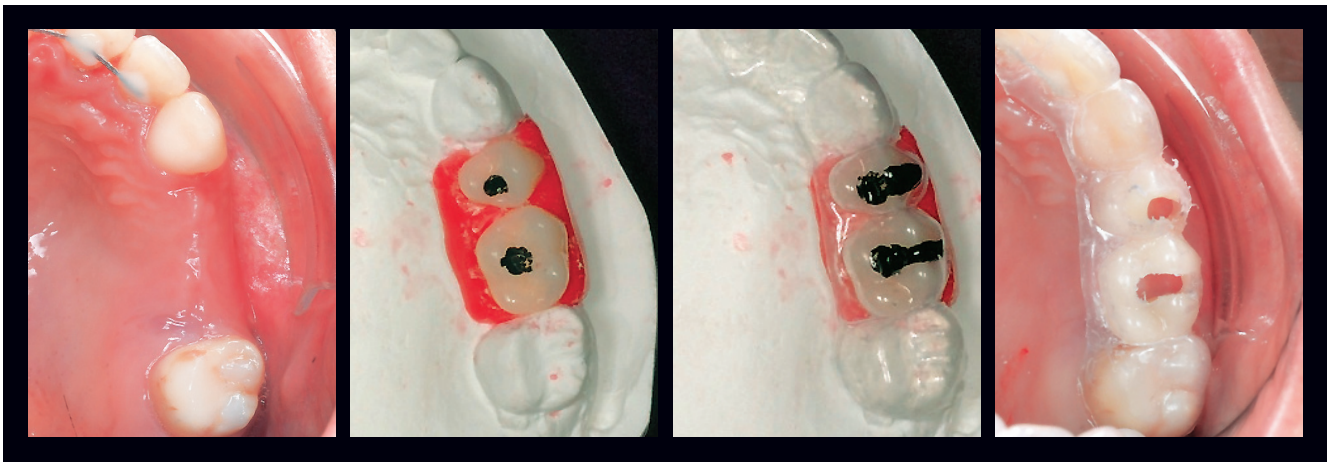

Fig. 23: Use a surgical stent to guide the correct position of implants.

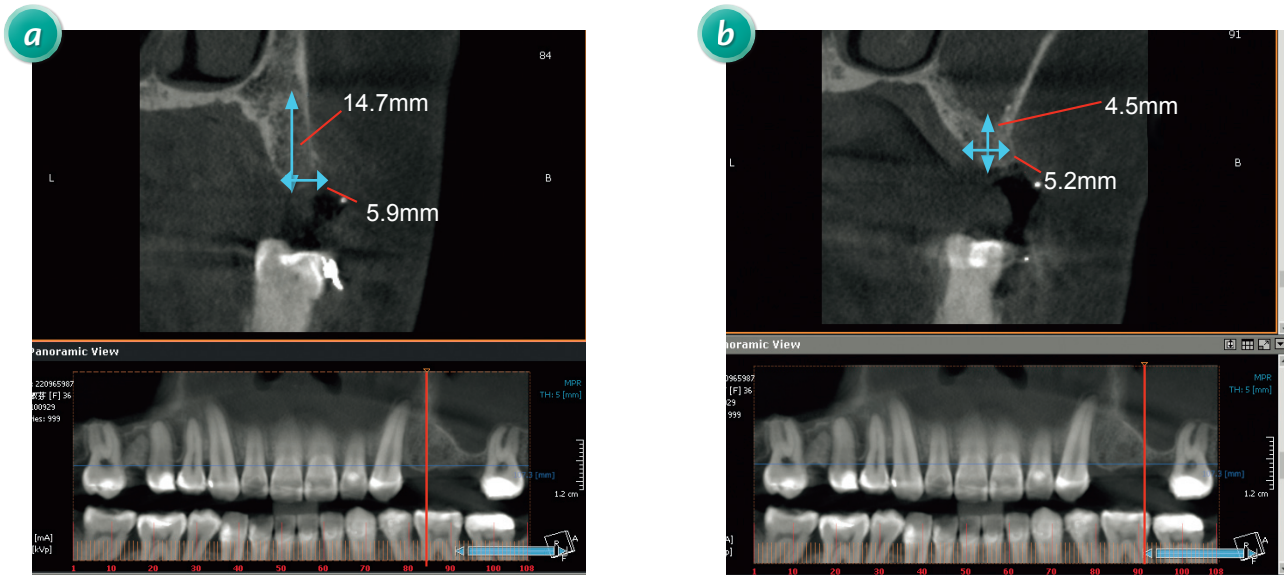

Fig. 24 a,b: After a prolonged period of tooth loss, the alveolar ridge became atrophic with insufficient bone height for implantation.

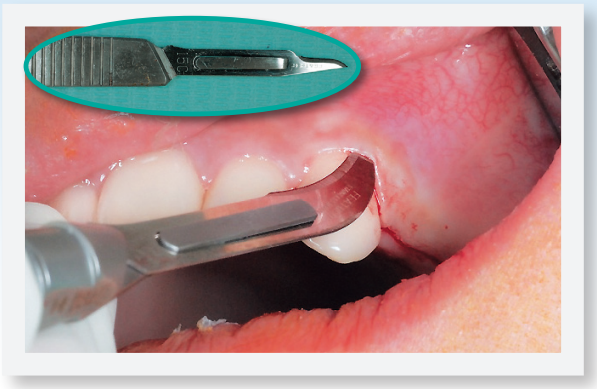

Fig. 25:

A full thickness mucoperiosteal flap, including buccal gingiva and alveolar mucosa, was raised using #12 and #15c blades.

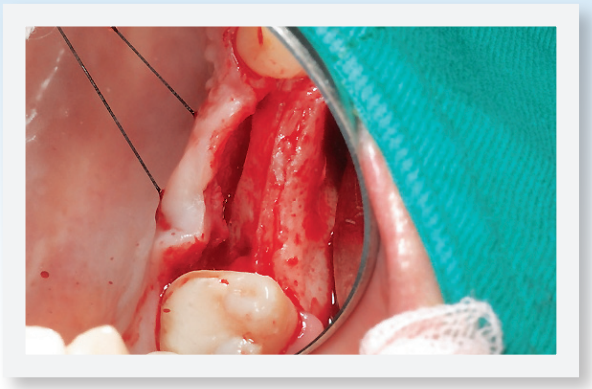

Fig. 26:

The palatal flap was tied with a needle holder and across over the mouth corner in order to obtain a clear surgical view.

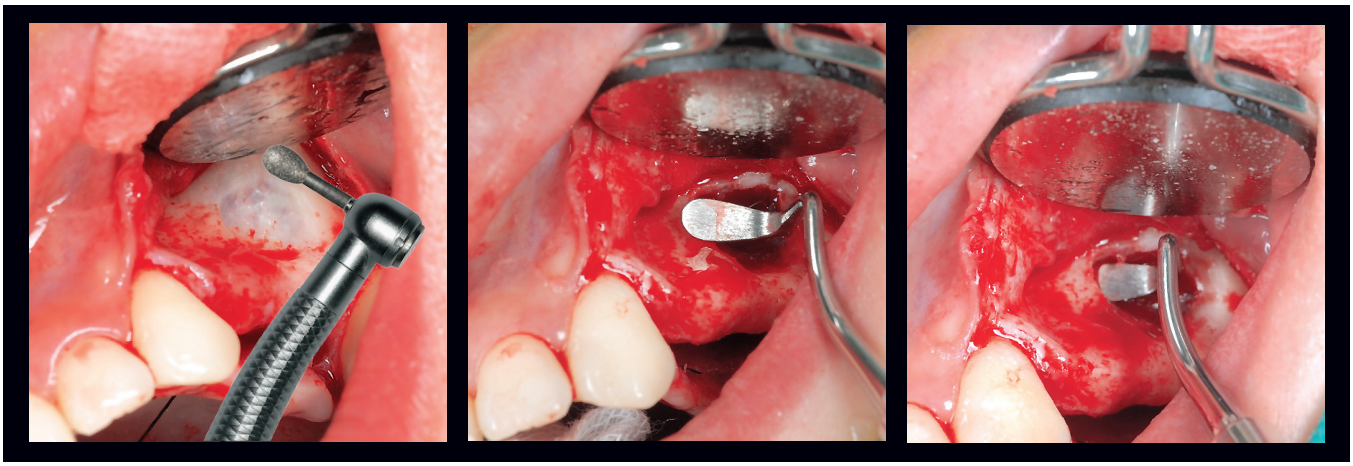

Fig. 27:

After the flap was elevated, a bony window was created in the lateral maxillary wall, and the Schneiderian membrane was elevated.

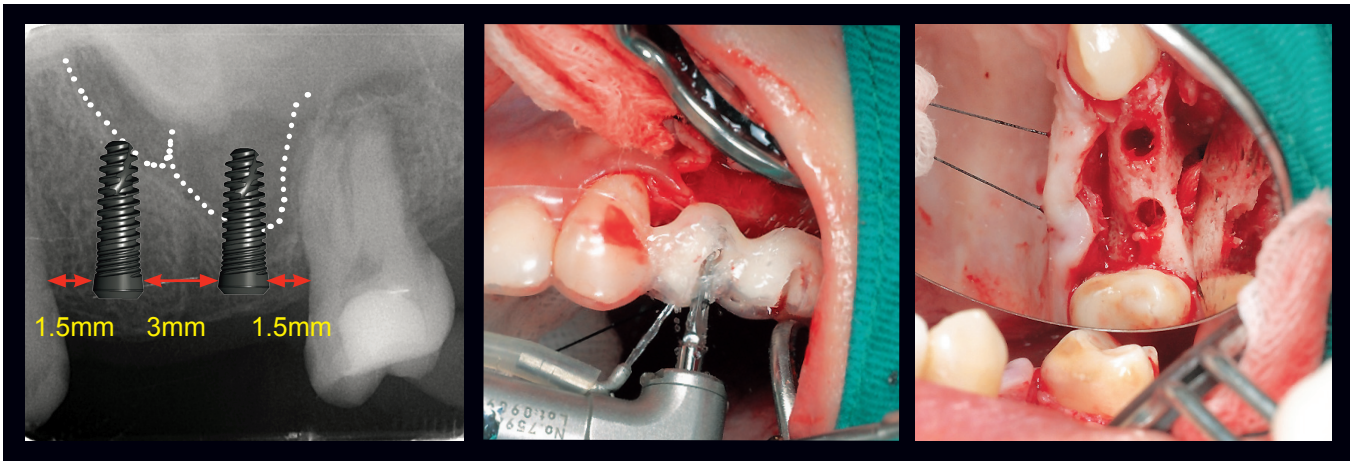

Fig. 28:

The ridge width was deemed sufficient for two 3.5 mm in diameter implants. Following the prescribed drilling protocol, two holes were drilled with the distance of 1.5mm from implant to tooth and 3mm between implants.

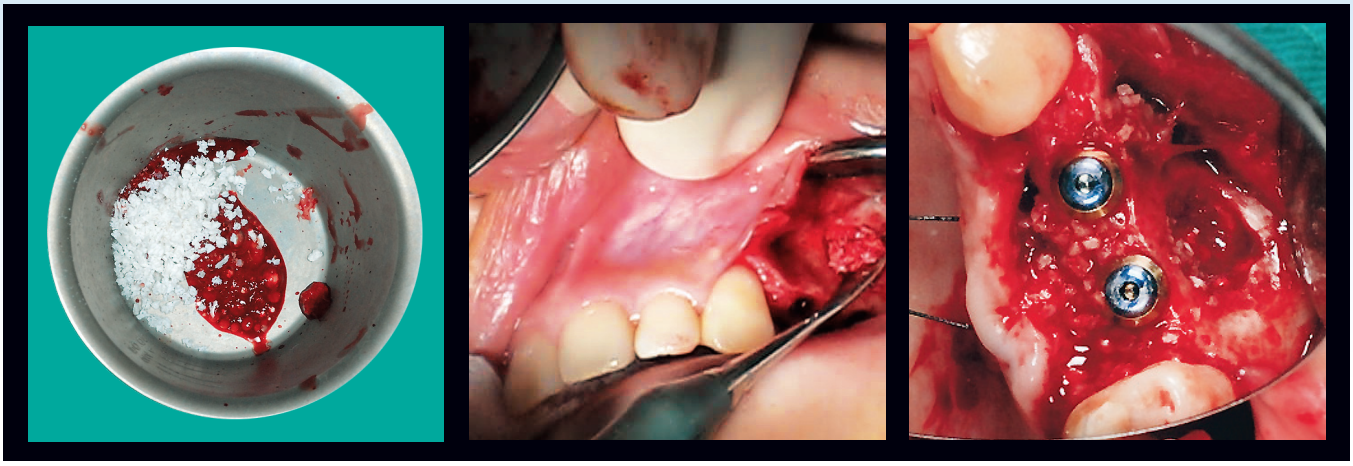

Fig. 29:

The bone grafting material (Bio-Oss®) with whole blood was poured into the space under the elevated Schneiderian membrane. After filling, two 3.5x10mm wide diameter fixtures with cover screws were placed.

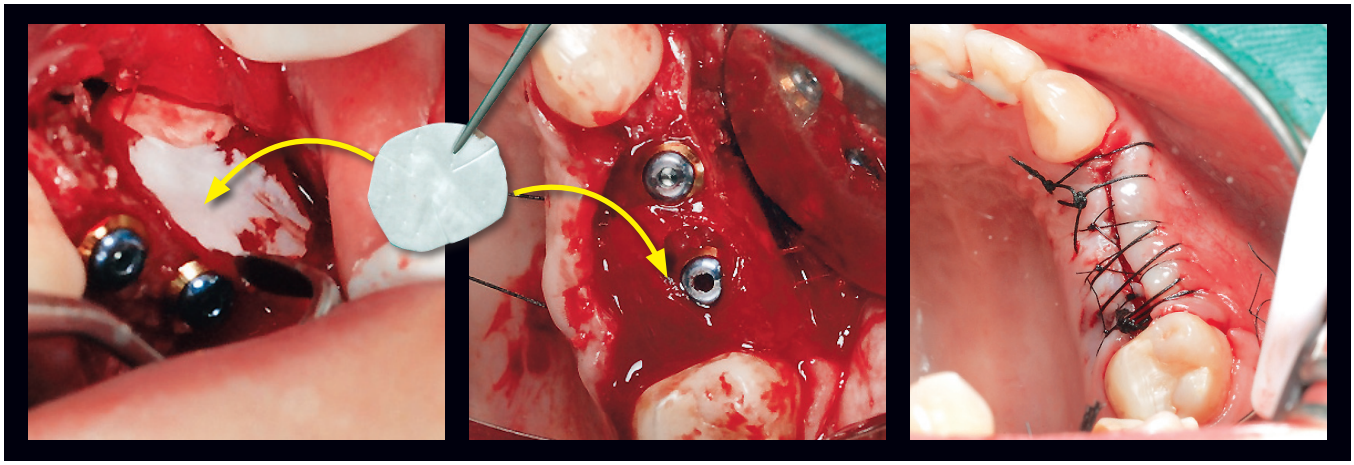

Fig. 30:

Two pieces of absorbable collagen membrane were placed between the bone graft and the Schneiderian membrane, as well as over the bony window and the palatal bone defect area. The flap was sutured with direct loop interrupted sutures (5-0 Nylon) and continuous mattress sutures (4-0 silk).

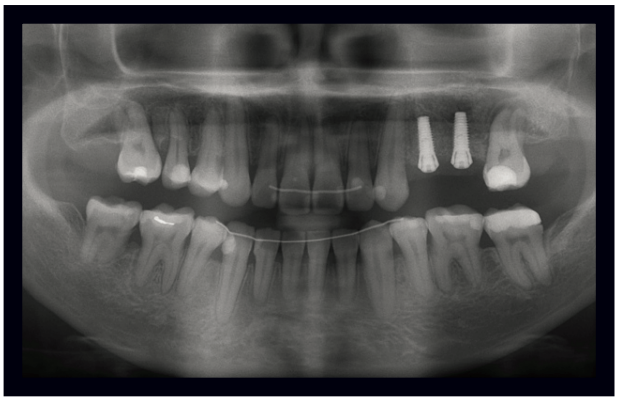

Fig. 31:

The post-surgery panoramic radiography confirmed that the accurate implant positions.

Fig. 32:

Four days after surgery, bruising was found from the patient's inferior border of the orbit to the lower border of the mandible.

the enlarged maxillary sinus anterior to the maxillary left 2nd molar (*Fig. 24*). The sinus lift procedure was indicated to increase the bone quantity in the posterior maxilla. A full thickness mucoperiosteal flap, including buccal gingiva and alveolar mucosa, was raised with #12 and #15c surgical blades (*Fig. 25*). The #12 surgical blade was used for the sulcus incision and the #15c surgical blade for mid-crestal incision. After opening of the full thickness flap, the buccal flap was sutured on the cheek. A palatal flap was secured with a needle holder and pulled to the other side of the mouth to obtain a clear surgical view of the exposed ridge (*Fig. 26*).

A trans-osseous window was created in the lateral maxillary wall with an oval diamond bur, and the Schneiderian membrane was elevated (*Fig. 27*). The length of the edentulous alveolar ridge was deemed adequate for two 3.5mm diameter implants. Following the prescribed drilling protocols, two holes were drilled. The distance from the implant to the adjacent tooth was 1.5mm and the interimplant distance was 3mm (*Fig. 28*). The bone grafting material (*Bio-Oss®*) was mixed with whole blood and the mixture was placed in the space beneath the elevated Schneiderian membrane. Two 3.5x10mm wide diameter fixtures with cover screws were placed (*Fig. 29*). Two pieces of absorbable collagen membrane were placed between the bone graft and the Schneiderian membrane, as well as over the bony window and the palatal bone defect area. The flap was sutured with direct loop interrupted sutures (*5-0 Nylon*) and continuous mattress sutures (*4-0 silk*) (*Fig. 30*).

The post-surgery panoramic radiography confirmed the accuracy of implant position (*Fig. 31*). Four days after surgery, bruising was noted from the patient's inferior border of the orbit to the lower border of the

Fig. 33:

The maxillary arch was bonded with conventional brackets from right 2nd molar to left canine. Two buttons were bonded on the palatal side of upper right 1st premolar and 2nd molar to close the residual space.

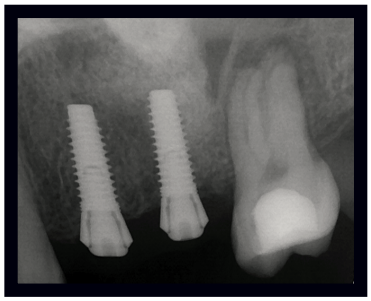

Fig. 34:

After 7 months of healing, the two implants have osseointegrated well.

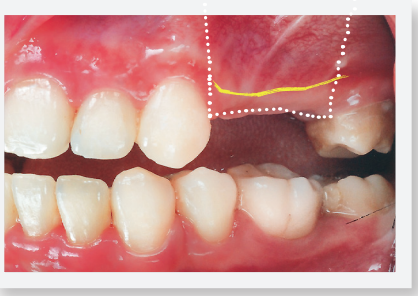

Fig. 35:

Insufficient keratinized gingiva over labial side was noticed.

Fig. 36:

A partial-full thickness mucoperiosteal flap including buccal gingiva and alveolar mucosa was raised using a #15c surgical blade.

Fig. 37:

After removing the cover screws, the marginal collar of tissue, including epithelium and granulation tissue around the fixtures, was removed.

Fig. 38:

The healing abutments were installed. The flap was repositioned apically and sutured with direct loop interrupted sutures (4-0 chromic) and horizontal mattress sutures (4-0 silk).

Fig. 39:

A periodontal dressing (Coe-Pak) was applied for wound protection and soft tissue retention.

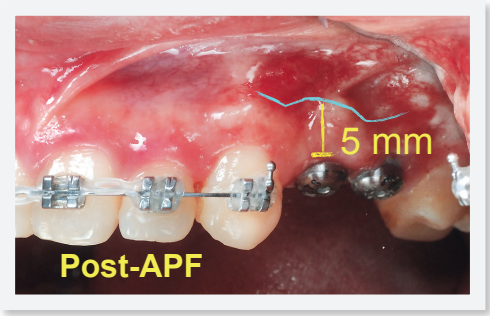

Fig. 40: *The final buccal keratinized gingiva had increased.*

mandible (*Fig. 32*). Hot compression was prescribed to reduce bruising.

Orthodontic retreatment phase

At 6 months after the implants were placed, a small space about 1mm was noted between upper right 2nd premolar and the adjacent 2nd molar. One month later, the maxillary arch was bonded with conventional brackets from right 2nd molar to left canine, and the archwire applied was a .016x.022 SS. Two buttons were also bonded on the palatal side of upper right 1st premolar and 2nd molar. Power chains were attached buccal and lingual to close the residual space (*Fig. 33*).

After 7 months of healing, the radiograph indicated two implants were well healed and osseointegrated (*Fig. 34*), but there was an inadequate amount of keratinized gingiva on the labial surface of the implants (*Fig. 35*). An apically repositioned flap was indicated to increased the dimensions of the attached gingiva on the buccal surface of the implants. A partial thickness mucoperiosteal flap of the palate and alveolar ridge was raised by a #15c surgical blade (*Fig. 36*), and continued as a vertical flap into the buccal vestibule. The flap had to be elevated beyond the mucogingival line in order to later reposition the keratinized soft tissue apically. A piece of gauze was put into the patient's mouth to ensure safety when removing the cover screws to prevent accidental swallowing. The marginal collar of tissue, including epithelium and granulation tissue around the fixtures, was removed (*Fig. 37*). After the healing abutments were installed, the flap was repositioned in a more apical position and sutured with direct loop interrupted 4-0 chromic sutures and 4-0 silk horizontal mattress sutures (*Fig. 38*). The wound was pressed with gauze, saturated

with normal saline, to prevent a submucosal dead space. A periodontal dressing (*Coe-Pak®*) was applied to protect the exposed bone and to retain soft tissue at the level of the bone crest (*Fig. 39*). Nine days later, the sutures were removed and the wound healing was satisfactory. After the apical reposition flap surgery, a 5mm width of buccal keratinized gingiva was achieved (*Fig. 40*).

After a three month period of follow-up tooth movement and soft tissue revision, all orthodontic appliances were removed, and the a maxillary fixed retainer on all teeth from the right lateral incisor to the left lateral incisor. A clear overlay retainer was delivered for the upper arch.

Implant prosthesis fabrication

One week later, the healing abutments were removed and replaced with multi-post, transmucosal abutments (*5.5mm post height and 1mm cuff width*), designed for the upper left 1st and 2nd premolars. The height of the implant abutments was adjusted to 4mm for the 1st premolar, and 4.5mm for the 2nd premolar. The buccal thickness of the abutments was reduced as needed. The torque ratchet was applied on the female screw with a force of 35 Ncm until the abutment was perfectly seated. A gingival cord was inserted into the peri-implant sulcus of both fixtures (*Fig. 41*).

Direct impressions, obtained with polyvinyl siloxane, were poured in type IV dental stone, and the casts were mounted on an articular. A metal copping was fabricated by a commercial laboratory. Margin integrity was checked with a dental explorer. Porcelain was fused to the coping and an occlusal screw access hole was retained in each abutment. After clinical adjustment, and verification of the fit and occlusion, the definitive crowns were completed. Cotton balls were placed in the screw access holes, and the crowns were luted to place with permanent cement (*Maxcem Elite, Kerr Inc.*). Finally, the screw access holes were sealed with composite resin (*Fig. 42*).

Results Achieved

Maxilla (*all three planes*):
- A - P: Retracted
- Vertical: Maintained
- Transverse: Maintained

Mandible (*all three planes*):
- A - P: Retracted
- Vertical: Maintained
- Transverse: Maintained

Maxillary Dentition
- A - P: Retracted
- Vertical: Maintained
- Inter-molar / Inter-canine Width: Maintained

Mandibular Dentition
- A - P: Retracted
- Vertical: Intruded
- Inter-molar / Inter-canine Width: Expanded

Facial Esthetics: Upper and lower lips were retracted, resulting in improved facial form.

Retention

The maxillary fixed retainer was bonded on all incisors. An anterior mandibular fixed retainer was bonded on all teeth from canine to canine. Upper and lower clear overlay retainers were delivered. The patient was instructed to wear them full time for the first 6 months and nights only thereafter. The patient was instructed in the home care and maintenance of the retainers.

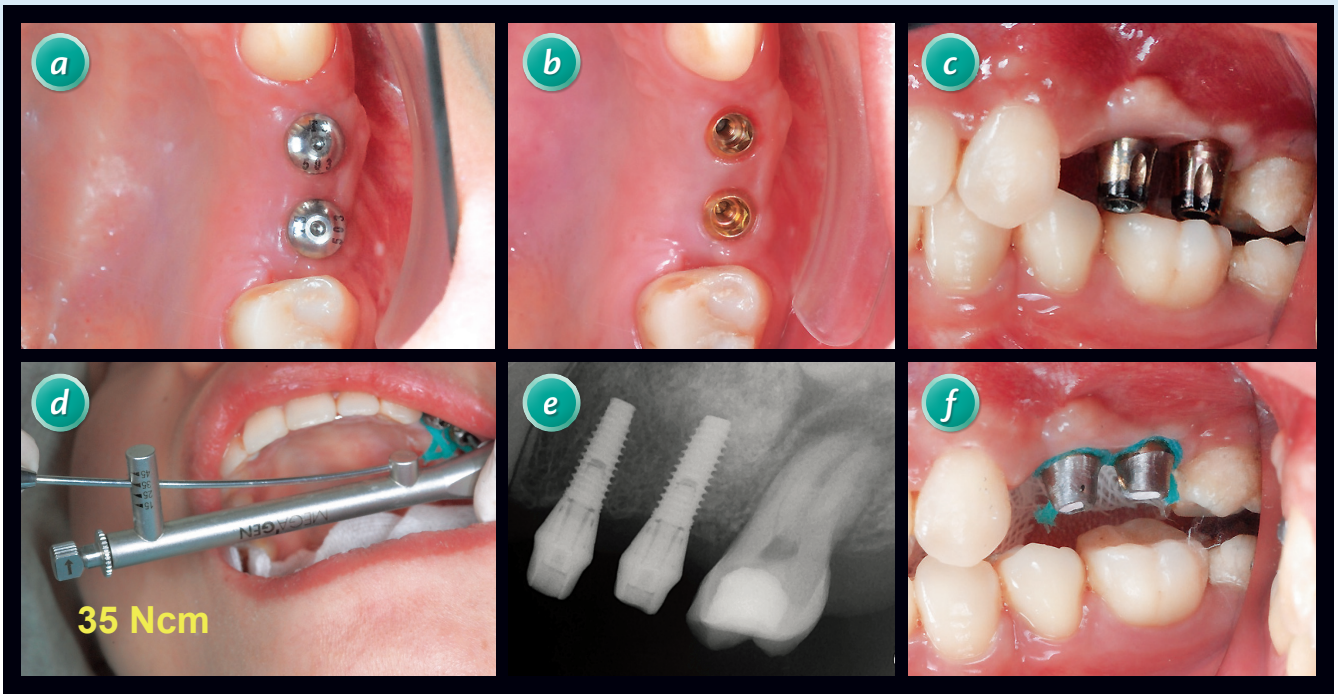

Fig. 41: a-f.

The healing abutments were removed and replaced with multi-post abutments (5.5mm post height and 1mm cuff height) from the implant fixtures of upper left 1st and 2nd premolars. The height of the implant abutments were adjusted to 4mm for #12, 4.5mm for #13 and the buccal thickness of the abutments were also reduced. After adjusting the abutment position, the torque ratchet was applied on the female screw with a force of 35 Ncm until the abutment was perfectly seated. A gingival cord was inserted into the peri-implants sulcus.

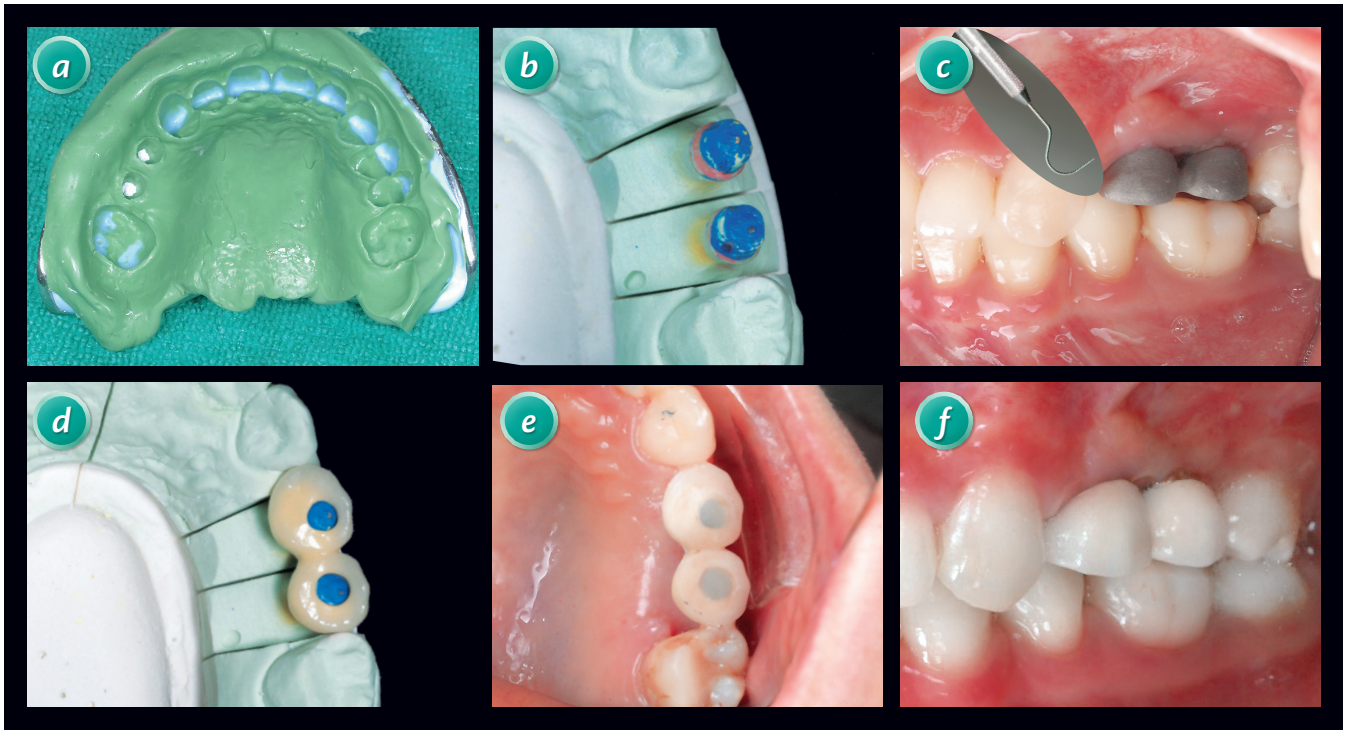

Fig. 42: a-f.

Direct impression technique was applied with polyvinyl siloxane. A cast was poured in type IV dental stone and articulated using the appropriate dental records. Metal copping were fabricated by lab technicians. The margin integrity was verified with a dental explorer. The occlusal surface was made by porcelain with a screw access hole. After adjustment and verification of the fitness and occlusion, the definitive crowns were then completed and luted to place with a permanent cement. The screw access hole was filled by composite resin.

Final Evaluation Of Treatment

The ABO Cast-Radiograph Evaluation score was 28 points for this restored, mutilated dentition. The major discrepancies were occlusal relationships (*7 points*) and alignment (*7 points*). Asymmetrical tooth loss, and an implant-supported prosthesis slightly out of occlusion (*Fig. 6*), were the major factors in the compromised final occlusal result. However, a final score of 28 points is an excellent result for a difficult, partially edentulous malocclusion that had a discrepancy index of 43, plus an additional 4 points in complexity due to the compromised implant site. Details of these scores are presented in the scoring sheets at the end of this report.

At the patient's initial consultation, it appeared that four implants would be required because of her severe malocclusion. With orthodontic space redistribution, only two implants were required (*Fig. 43*). Furthermore, orthodontics was required to correct the bimaxillary protrusion to improve facial esthetics (*Figs. 4, 9 and 43*).

Retraction of the upper and lower anterior incisors and closure of upper excessive extraction spaces for implantation resolved the patient's chief complaints. The excessive spaces of the upper and lower extraction sites were eliminated. However, long-term retention is critical to prevent relapse. Two implant-supported crowns were inserted into the edentulous spaces of upper left posterior segment to increase the patient's occlusal function.

Overall, there was significant improvement in both dental esthetics and occlusion. The profile was dramatically improved and dental esthetics were excellent.

Discussion

Conventional orthodontic treatment options for adults with class II high angle malocclusion are either extractions or orthognathic surgery. In the present case, the patient had large edentulous spaces in the maxilla and two deep carious lesions in the lower right 1st premolar and 2nd molar. Therefore, both 1st premolars and the right 2nd molar were extracted in the mandibular arch. In addition to correction of the dental Class II relationship, the other major treatment objective was to improve facial balance. The mandibular incisors were intruded and aligned over the apical base of bone, resulting in the desired esthetics and functional rehabilitation. Treatment of an adult Class II malocclusion, with extraction of mandibular premolars, requires careful anchorage control to achieve a final Class I molar-canine relationship.[1] Anchorage provided by bone screws is simpler, causes less discomfort and requires no patient cooperation, compared with traditional anchorage devices, including miniplates and head gears.[2] In addition, patients with stainless steel bone screws reported minimal problems from swelling, speech difficulty, chewing efficiecy. Direct placement of bone screws without flap surgery has a high success rate.[3]

Anterior bite turbos were placed on the palatal side of upper incisors to open the bite.[4] Ideally, it is beneficial to maximize the horizontal component and minimize the vertical component when prescribing intermaxillary elastics. Typically Class II elastics extend from the maxillary canines to the mandibular first molars. However, it is important to remember that the horizontal component of intermaxillary elastics causes rotation of the arch, because the line of force is gingival to the center of resistance of the dentition. Thus, the effect of

intermaxillary elastics must be carefully monitored during treatment.

When large spaces are closed in the arch, the accumulation of attached gingiva can be obstructive to complete space closure. Interdental soft tissue build-up may be a factor in reopening of spaces. The excess soft tissue may require surgical or laser removal.[5]

The antral (*Caldwell-Luc*) approach for sinus bone grafting has become a popular technique for vertical bone augmentation in the posterior maxilla, in preparation for implants.[6] Implant placement can be performed simultaneously with the sinus elevation procedure, or following a healing period of 6-9 months. Immediate placement during sinus elevation reduces overall healing time and eliminates another surgical procedure, both of which are desirable for most patients. Since sinus lift procedure is often essential for posterior maxillary rehabilitation, it is important for dentists to be familiar with this surgery and the manner in which the maxillary anatomy is altered.[7]

Several types of bone-graft materials are routinely used in sinus lift surgeries. Autogenous bone from the iliac crest or maxillary tuberosity may be used in some patients. However, commercial allograft products are usually the most convenient: frozen, freeze-dried and/or demineralized freeze-dried bone, as well as hydroxyapatite allograft materials.[8] Hydroxyapatite (*HA*) is a resorbable calcium phosphate material that acts as a biocompatible foundation for new bone regeneration. Some authors have found more success when HA is mixed with freeze-dried bone.[9] A variation on this technique is to place a piece of autogenous cortical bone in the sinus, inferior (*caudad*) to the bony flap, to reinforce the graft. [10,11]

The most common complication during sinus lift procedures is perforation or puncture of the sinus membrane. A tear in the membrane can provide a gateway for sinus infection. If a perforation occurs, clinicians should either repair the defect with sutures or place a patch over it. An antibiotic is prescribed to help prevent infection. The actual bone grafting procedure should be postponed until the membrane has healed. The sinus lift procedure is performed a few months later, after the membrane has healed.

After the installation of implant(*s*), host tissues may respond in one of the three scenarios: 1. acute or chronic inflammatory process, causing early implant failure; 2. formation of a fibrous connective tissue interface, leading to later implant failure, and 3. vital bone tissue formation on the surface and adjacent the implant, resulting in osseointegration.[12]

Guided bone regeneration (*GBR*) is another routinely practiced procedure to preserve or augment the alveolar ridge if there is an osseous defect. Histomorphometric analysis of biopsies revealed that more vital bone is formed in sites treated with GBR compared to sites that were left to heal spontaneously. The use of GBR to increase ridge volume is well documented, but it requires a long healing period before implants can be placed. [13] A commonly used periodontal dressing (*Coe-Pak®*) serves a variety of purposes, such as: 1. protect the wound post-operatively, 2. maintain a close adaptation of the mucosal flaps to underlying bone, which is especially useful when a flap has been repositioned apically, and 3. patient comfort. In addition, periodontal dressings help prevent post-operative bleeding and excessive formation of granulation tissue.[14] The latter is particularly helpful for interproximal healing, but it requires skill in positioning the dressing material.

A good surgical stent provides precise guidance for implant placement to achieve ideal 3D positioning within available bone. Use of stent helps to optimize the position of contact point(*s*), tooth emergence profile, and the height of the implant base. Biological width is an important consideration: there should be 1mm of gingiva sulcus and 2mm of junctional epithelium and connective tissue.[15,16] Determination of an ideal implant location should be based on the cervical contour of the planned restoration at 3 mm depth, with at least 2mm buccal of bone plate preserved. If the buccal bone plate will be less than 2 mm, there are three possibilities: 1. place the implant more lingually, 2. choose the smaller diameter implant fixture, and/or 3. augment buccal bone with a GBR procedure, to improve bone thickness.[17] Chang's 2B-3D rule provides an excellent guide for ideal implant placement (*Fig. 44*).[18,19]

If the smooth implant crest is 2 mm or more wide, two implants should be placed 3 mm apart. Since the expected crestal bone loss is less than 1.5mm, two adjacent implants, 3mm or more apart, are unlikely to result in a horizontal defect that increases sulcus depth, thereby resulting in a loss of papilla height.[20]

Geramy, et al.[21] compared the outcomes of mandibular molar crowns with three types of implant support. They reached three conclusions. First, increasing the diameter of the implant from 3.75 mm to 5 mm reduced the mesio-distal and bucco-lingual displacement of the implant/crown complex by approximately 50%, when the crown was loaded at the disto-buccal cusp tip or the distal marginal ridge. Second, the greatest reduction in mesio-distal displacement occurred with the 2-implant design. Third, the two-implant design showed a similar reduction in the bucco-lingual displacement when compared with the crown supported by a 5mm implant (*Fig. 45*). For the present case, the edentulous space after orthodontic

Fig. 43:

Four implants appeared to be required in the initial consultation without considerations for the malocclusion. If this patient didn't receive orthodontic treatment, the bimaxillary protrusion couldn't be resolved, the facial esthetic couldn't be improved. Without orthodontic space redistribution, this patient might need two more implants.

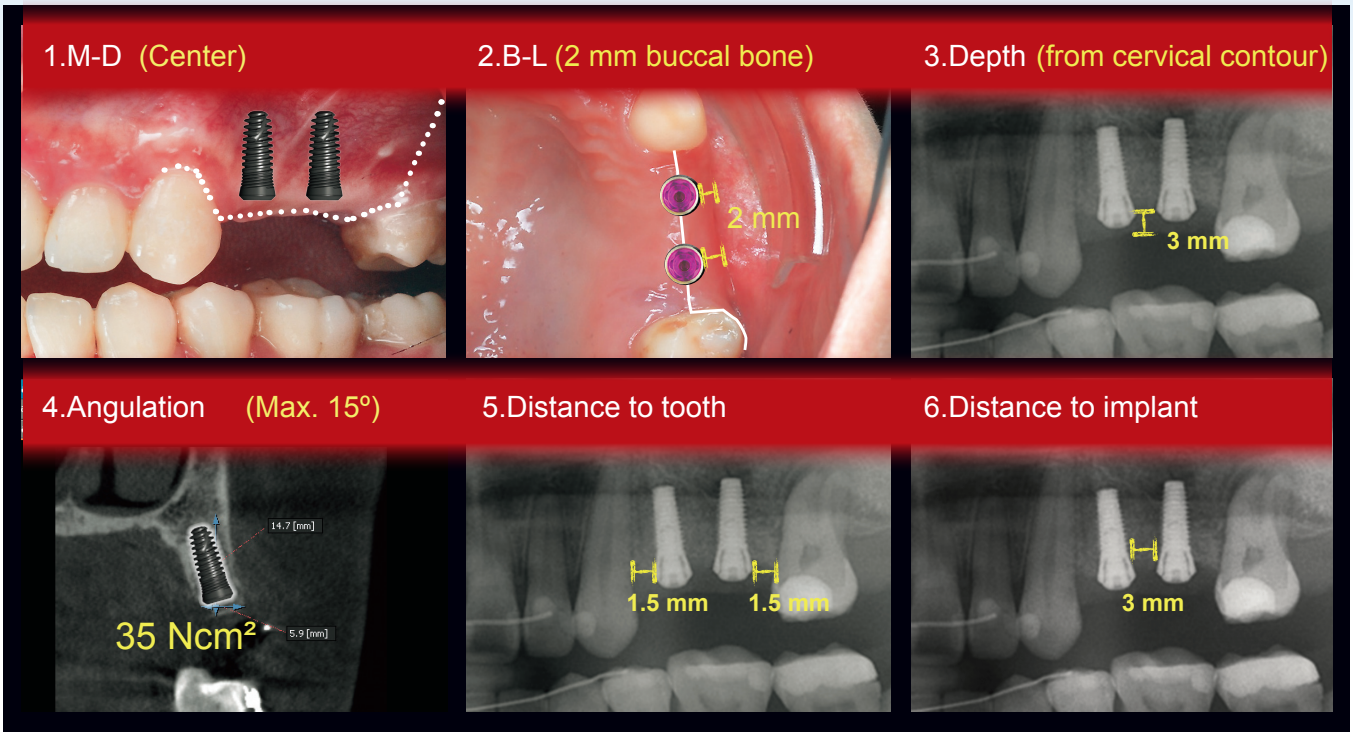

Fig. 44:

Dr. Chang suggests six factors to determine an ideal implant position as follows: 1. M-D (center), 2. B-L (2 mm buccal bone thickness), 3. Depth (3mm depth from cervical contour), 4. Angulation (max. 15°), 5. Distance to adjacent tooth / implant (≥1.5 mm), 6. Distance to adjacent implant / implant(≥ 3 mm).

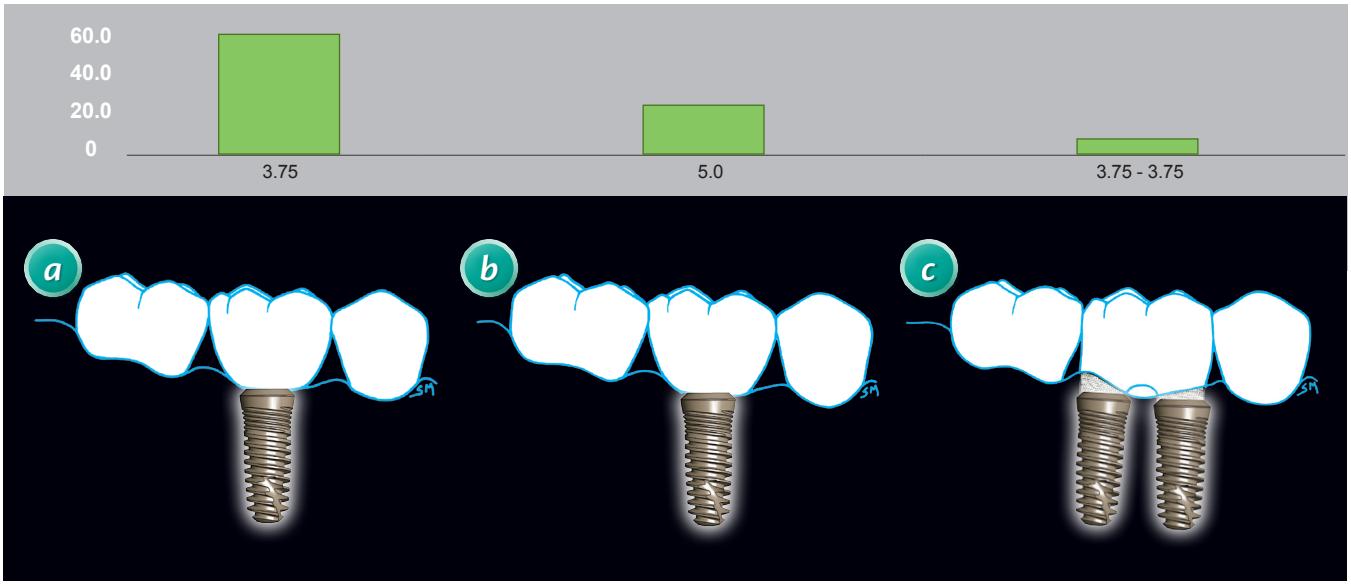

Fig. 45:

a. a mandibular molar supported by a. 3.75mm diameter implant.

b. a mandibular molar supported by a 5mm diameter implant.

c. a mandibular molar supported by two implants, each with a 3.75mm diameter.

treatment was ~15mm, so a two-implant design was suggested. Micromotion is best controlled by a wider-diameter implant-supported crown or by two implants.

The two-implant design provided less improvement in the recorded bucco-lingual displacement with off-center loading. That result suggested that centralizing the forces over the implant platform tended to reduce the potential for displacement. Occlusal forces on the implant should be directed axially as much as possible by: 1. narrowing the occlusal table, 2. maintaining maximal intercuspal contacts along the central groove of the artificial crown, and 3. eliminating eccentric occlusal contacts.

Masticatory forces acting on dental implants can result in undesirable stress in adjacent bone, which in turn can cause bone defects and the eventual failure of implants. According to the study of Himmlova et al.22 maximum stress areas were located around the implant neck. The decrease in stress was the greatest (*31.5%*) for implants with a diameter ranging from of 3.6mm to 4.2mm. Further stress reduction for the 5.0-mm implant was only 16.4%. An increase in the implant length also led to a decrease in the maximum von Mises equivalent stress values. The influence of implant length, however, was not as pronounced as that of implant diameter (*Fig. 46, 47*). Thus, this finite element study suggests that implant diameter may be a more influential factor for the reduction of masticatory stress than implant length. Implants with a diameter of 4.2 mm demonstrated an advantage in simulated stress distribution when compared with the 3.6-mm diameter implants. [22]

According to Chang's Sinus Lift Decision Tree (*Fig. 48*), the current patient had 6 to 8 mm ridge thickness and normal occlusion, therefore, a short implant of 6-8 mm was indicated.

However, for patients with 6 to 8mm ridge thickness, and heavy occlusion, the crestal approach sinus lift technique and a 8-11mm implant should be considered. For patients with a 4 to 5mm ridge thickness, but requiring only one implant, the crestal approach sinus lift technique is deemed appropriate with a 8-11 mm implant. If only 1 to 4mm of ridge thickness is available and multiple implants are required, the lateral window, sinus lift technique, combined with 11~13mm implants, is advised.

The current patient had an insufficient ridge height of only 4.5mm, so the lateral window, sinus lift technique was indicated to increase ridge thickness. The atrophic alveolar ridge complicated the subsequent implant therapy. Based on the implant selection and prosthesis design, two narrow (*3.5 mm wide*) implants of 10 mm length, combined with a splinting type prosthesis, were chosen to reduce stress on the narrow ridge. An inadequate amount of keratinized gingiva often causes gingiva inflammation and subsequent implant failure. An apically positioned flap (*APF*) is indicated when there is inadequate amount of keratinized gingiva over the implant site. A minimum of 3mm of keratinized gingiva is the usual clinical requirement. If a minimum of 3mm of attached tissue cannot be preserved, then an APF technique should be prescribed. For APF, an incision is made on the midcrestal area of the edentulous ridge with the intent of preserving as much keratinized gingiva as possible. A #15c surgical blade was used for

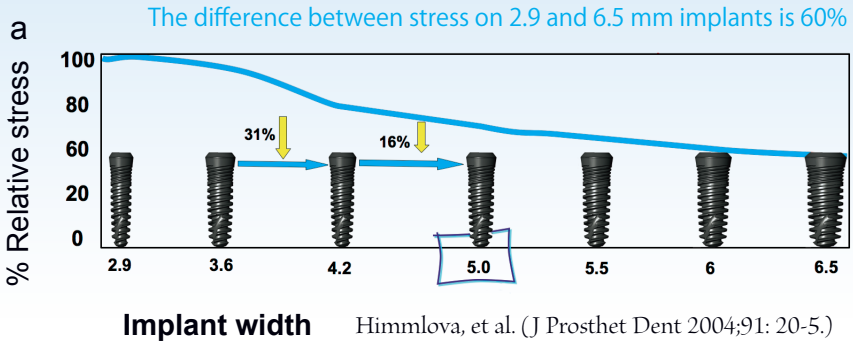

Fig. 46:

a. The finite element study stated that implant diameter may be a more influential factor for the reduction of masticatory stress than implant length. Implants with a diameter of 4.2mm demonstrated an advantage in simulated stress distribution when compared with the 3.6-mm diameter implants.

b. Distribution of von Mises equivalent stress around implants with different diameters.

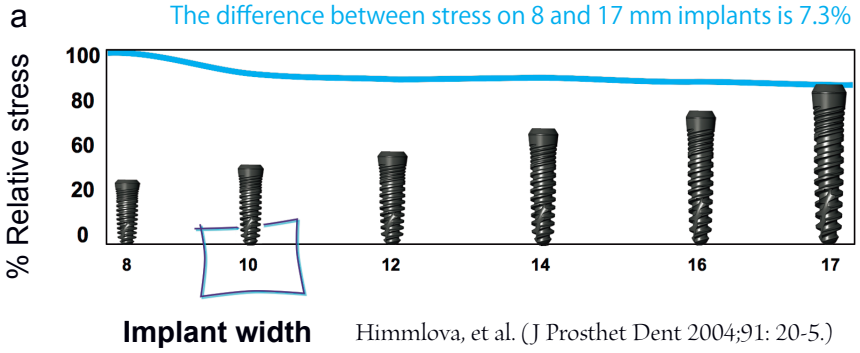

Fig. 47:

a. An increase in the implant length also led to a decrease in the maximum von Mises equivalent stress values. The influence of implant length, however, was not as pronounced as that of implant diameter.

b. Distribution of von Mises equivalent stress around implants with different length.

the lingual line angle incision method. It started with a partial thickness flap, when the incision was extended into vestibule, as a the split partial thickness flap was raised (*Fig. 49*). The pedicle flap was then apically positioned and sutured to the periosteum. A 40% shrinkage rate of keratinized gingiva is expected postoperatively. To preserve at least 3mm of the final buccal keratinized gingiva, it is necessary to create over 5mm of buccal keratinized gingiva with the APF (*Fig. 50*). [23]

In order to minimize post-operative pain and discomfort for the patient, surgical handling of tissue should be as atraumatic as possible. Precautions must be taken to avoid perforation of the flap and the sinus membrane. The bone should be kept moist during the surgery, and a tension-free primary flap closure is essential. The pain experienced by patients is mostly limited to the first days after surgery. Swelling and bruising are usually the chief post-operative sequelae. Often, swelling and bruising extend from the inferior border of the orbit to the lower border of the mandible, or even onto the neck. In order to reduce swelling, it is important to cool the area with cooling pads at least for the first 6 hours after the surgery. Occasionally, minor bleeding

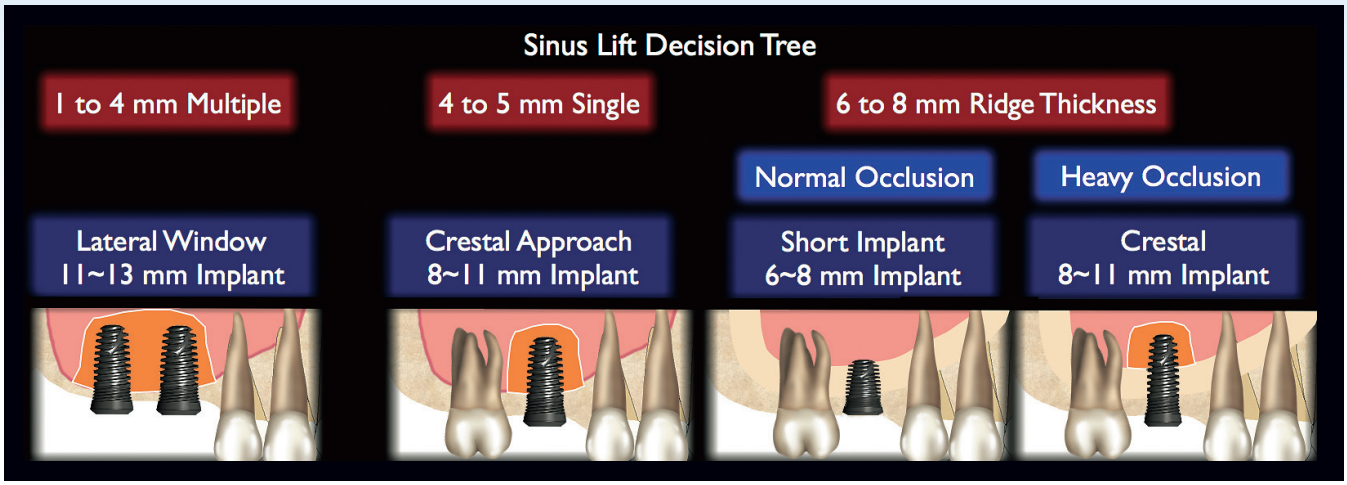

Fig. 48: Chang's Sinus Lift Decision Tree is an excellent reference for determining ideal implant placement position and size selection.

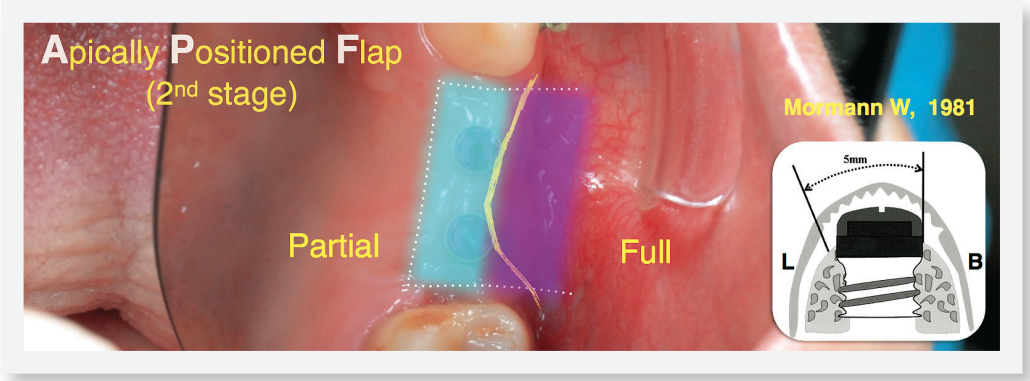

Fig. 49: The incision line (dot line) of an apically positioned flap and a partial-full thickness flap should be raised.

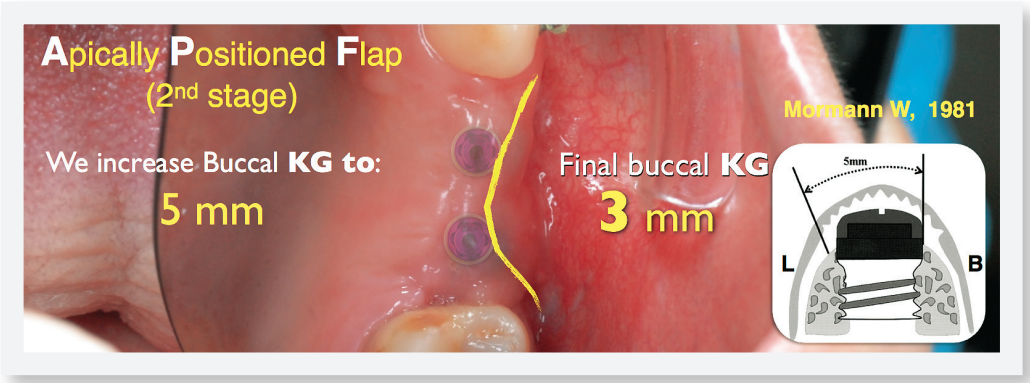

Fig. 50: The increased buccal keratinized gingiva should be over 5mm to allow for 40% shrinkage post-surgery.

DI-CRE-P&W comparative table

DI	CRE	P & W
10 ~ 19	≦ 26	≦ 6
20 ~ 29	≦ 30	≦ 6
30 ~ 39	≦ 34	≦ 6
40 ~ 49	≦ 36	≦ 6
50 ~ 70	≦ 38	≦ 6

DI: **D**iscrepancy **I**ndex; **CRE**: **C**ast-**R**adiograph **E**valuation; **P** & **W**: **P**ink & **W**hite Esthetic Score.

■ Table 2 . DI-CRE-P&W comparative table for final result evaluation in relation to case complexity.[25,29]

may arise from the nose. It is important to inform patients of potential irritation in the nasal area. In the event of sneezing, the nose should not be covered to release air pressure. After the surgery, patients are placed on antibiotic therapy. Furthermore, antiseptic rinses with 0.1–0.2% chlorhexidine twice daily are prescribed for the first three weeks after surgery.[24]

Conclusion

Full mouth evaluation of patients, with bimaxillary protrusion and multiple missing teeth, is critical for determining bracket torque selection and specifying the required implant space(s). Orthodontic treatment combined with implant therapy can achieve near ideal dental alignment, optimal intermaxillary occlusal relationships, and good facial esthetics.

The sinus lift is commonly required for bone augmentation in partially edentulous adult patients. Edentulous alveolar ridges atrophy, due to surface resorption and sinus enlargement, resulting in insufficient bone height for implantation.

An inadequate band of keratinized gingiva often results in gingiva inflammation and subsequent implant failure. An apically positioned flap (*APF*) is indicated when patients have insufficient keratinized gingiva covering the implant site. The combined orthodontics and implant treatment plan successfully resolved the patient's protrusion and closed the edentulous spaces. This difficult malocclusion (*DI = 43, Implant site = 4*) was treated to an acceptable result (*CRE = 28*)(*Table 2*). The patient and the clinician were pleased with the treatment result.

Acknowledgment

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 43

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 = 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 = 1

OCCLUSION

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per side 2, 2 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. 4

Each degree < -2° 1 x 1 pt. = 1

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

SN-MP

≥ 38° = 2 pts. 2

Each degree > 38° 4 x 2 pts. = 8

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt. 1

Each degree > 99° 14 x 1 pt. = 14

Total = 30

OTHER (See Instructions)

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

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) = 2

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

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

Total = 4

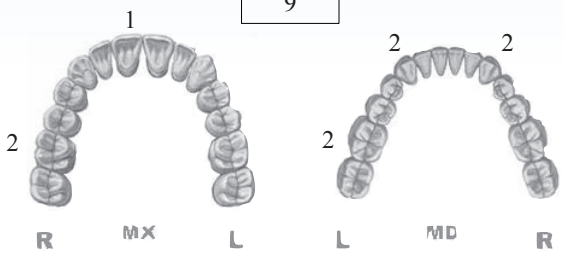
Cast-Radiograph Evaluation

Case # 1 **Patient**

Total Score: 28

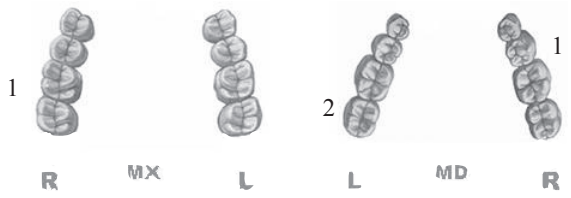
Alignment/Rotations

9



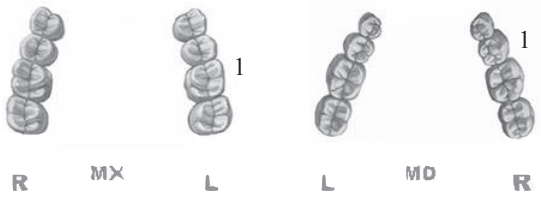
Marginal Ridges

4



Buccolingual Inclination

2

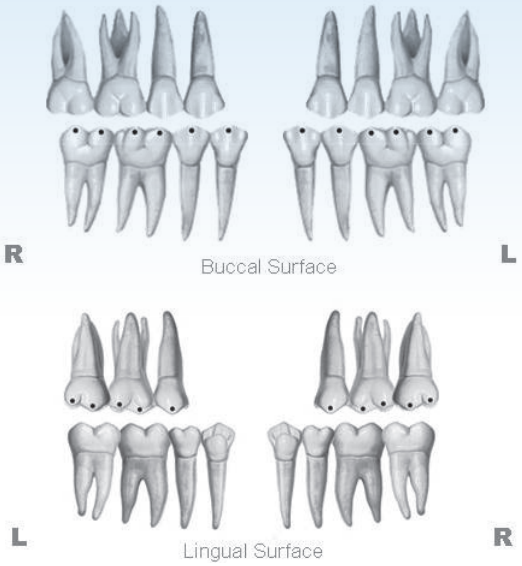


Overjet

0

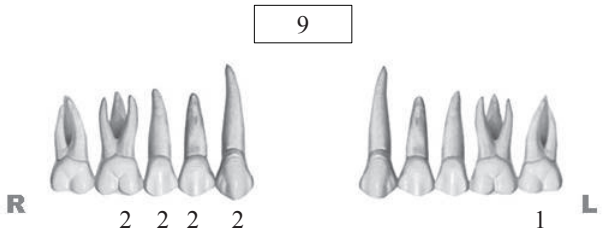
Occlusal Contacts

0



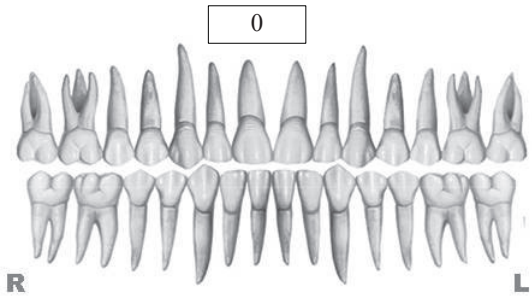
Occlusal Relationships

9



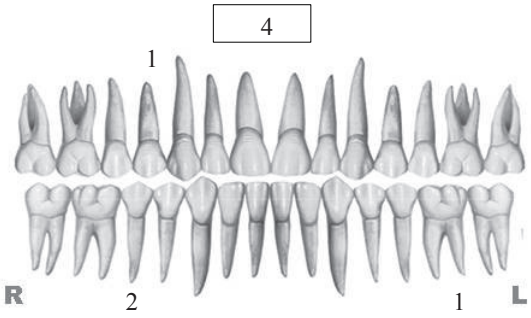
Interproximal Contacts

0



Root Angulation

4



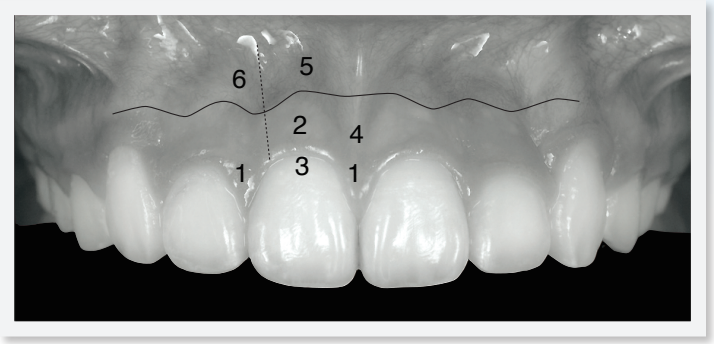
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

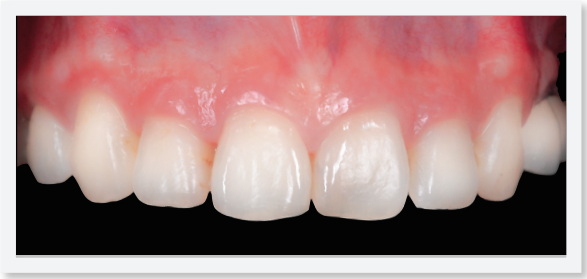
Total Score: = 3

1. Pink Esthetic Score

Total = 0

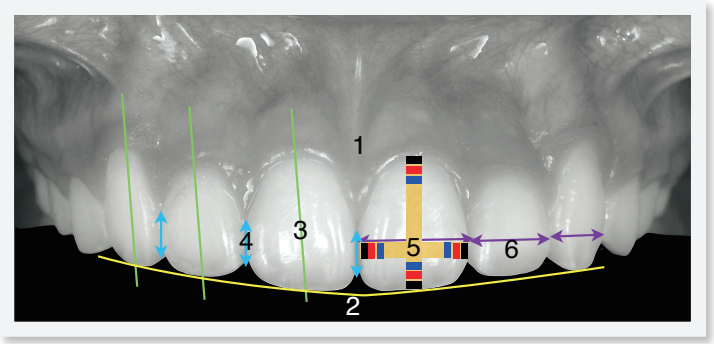


1. M&D Papilla	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

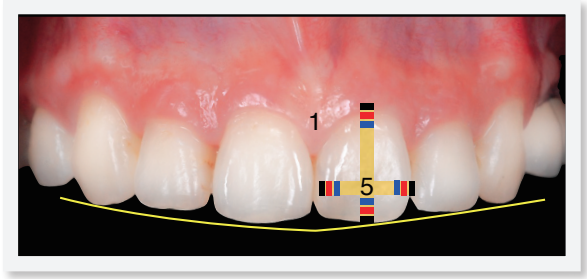


1. M&D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

Total = 3



1. Tooth Form	0	1	2
2. Mesial & Distal Outline	0	1	2
3. Crown Margin	0	1	2
4. Translucency (Incisal thrid)	0	1	2
5. Hue & Value (Middle third)	0	1	2
6. Tooth Proportion	0	1	2



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

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Early Intervention of Class III Malocclusion and Impacted Cuspids in late mixed dentition

History And Etiology

A 10 year and 2 month girl was referred by her family dentist for orthodontic consultation (*Fig. 1*). There was no contributory medical or dental history. Her chief complaint was a protrusive lower lip with the mouth closed. The relatively severe Class III developing malocclusion is documented in Figs. 2 and 3. The patient and her parents desired comprehensive orthodontic treatment to achieve an ideal profile and alignment of the entire dentition (*Figs. 4-6*). The pretreatment and posttreatment radiographic documentation is shown in Figs. 7 and 8, respectively. Fig. 9 illustrates the influence of the functional shift on facial esthetics, indicating that the patient is a good candidate for conservative management of this severe malocclusion in the late mixed dentition.

Fig 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

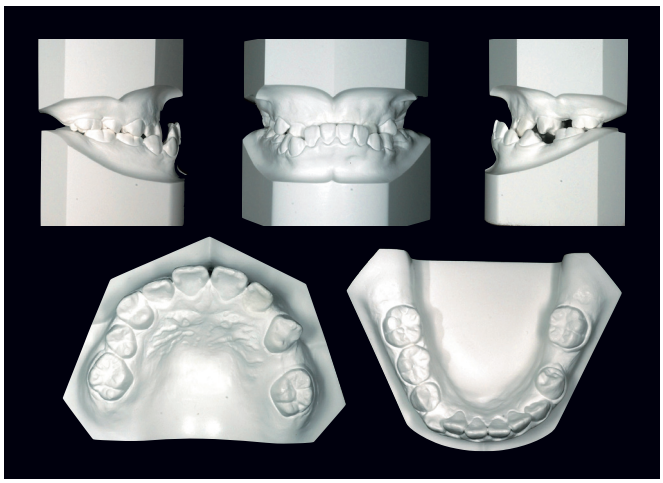

Fig. 3: Pretreatment study models

The initial clinical examination in centric occlusion revealed a full Class III malocclusion with an anterior crossbite of about 5mm (*overjet -5mm*) and an overbite of 5mm. The mandibular dental midline was 2 mm to the left of the facial and maxillary midlines (*Fig. 7*); distally positioned maxillary incisors with blocked out canines were the contributing factors. All deciduous teeth were exfoliated except the lower right primary second molar (*Fig. 7*). The pretreatment panoramic radiograph (*Fig. 7*) revealed that both maxillary canines were superiorly positioned and blocked out. Although the treatment plan was to achieve an ideal alignment of the impacted cuspids

Dr. Yu Lin Hsu, Lecturer, Beethoven Orthodontic Course (right)
Dr. Chris HN Chang, Director, Beethoven Orthodontic Center (middle)
Dr. Eugene W. Roberts, Consultant,
International Journal of Orthodontics & Implantology (left)

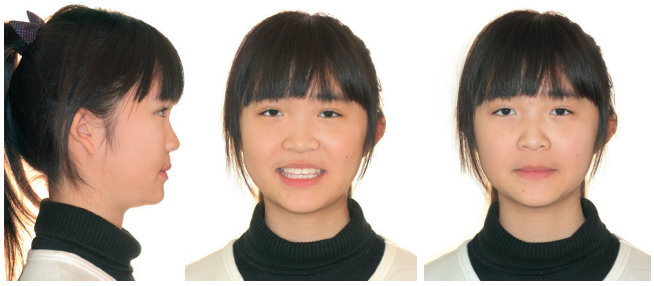

Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models

(*Fig. 8*), there was inadequate space for them to erupt. Fig. 10 documents the cephalometric history of the treatment rendered.

Diagnosis

Skeletal :

- Skeletal Class III with SNA 80°, SNB 85° and ANB -5° (*Fig. 7 and Table 1*).
- Normal mandibular plane angle (*SN-MP 33°, FMA 28.5°*).

Dental :

- Right end-on Class III molar relationship Let full cusp Class III molar relationship
- OB: 5 mm OJ: -5 mm
- Space deficiency in the maxilla was ~12mm Deep Curve of Spee in the mandibular arch Retained right mandibular primary second molar. No signs or symptoms of TMJ dysfunction Discrepancy Index (*DI*): 54

Facial :

- Protrusive lower lip associated with functional shift for maximum interscuspation.

Specific Objectives Of Treatment

Maxilla (*all three planes*):

- A - P : Allow for normal expression of growth.
- Vertical : Allow for normal expression of growth
- Transverse : Maintain

Fig. 7:

Pretreatment pano and ceph radiographs show multiple impacted permanent teeth and retained primary molar.

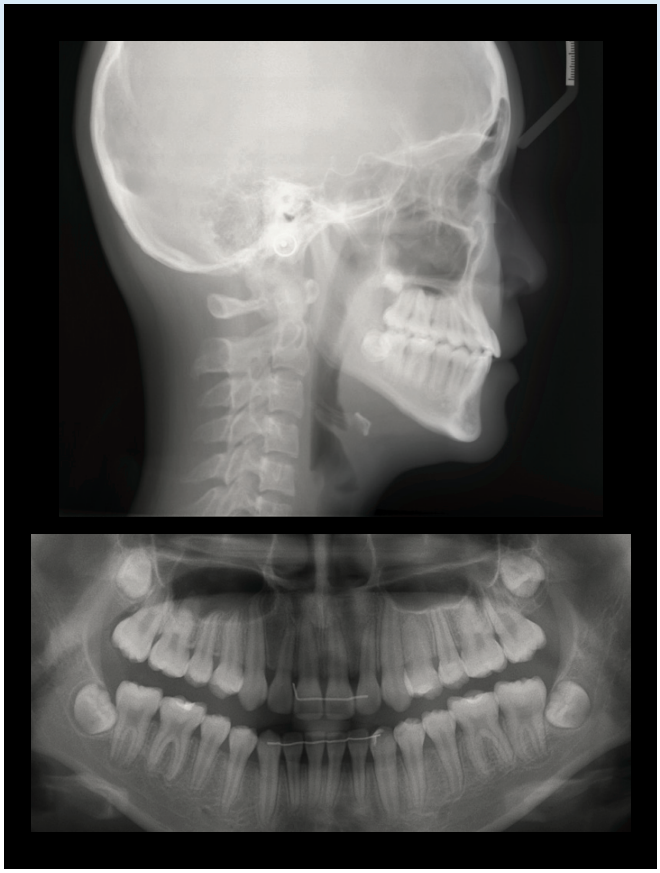

Fig. 8:

Posttreatment pano and ceph radiographs show a balancing lip profile.

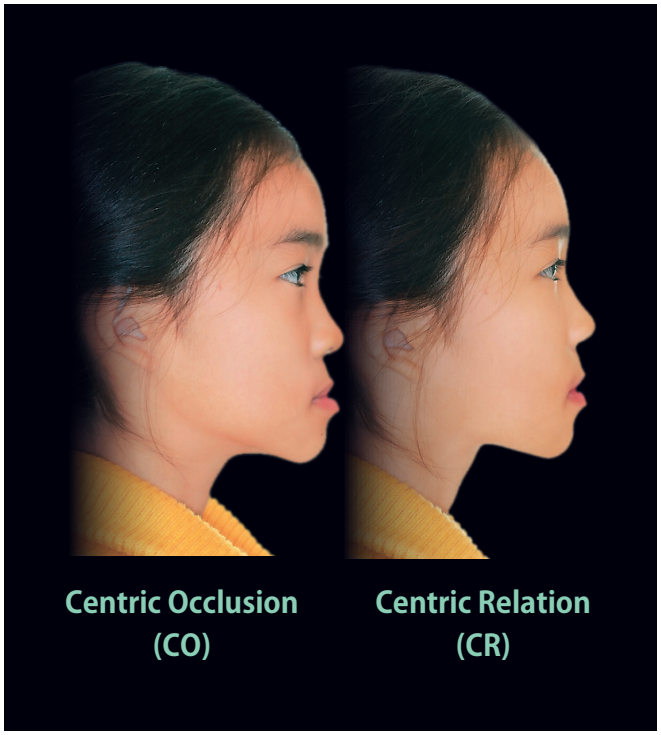

Fig. 9. Lateral profile in CO and CR position.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	80°	81.5°	1.5°
SNB°	85°	85.5	0.5°
ANB°	-5°	-4°	1°
SN-MP°	33°	34°	1°
FMA°	28.5°	30°	1.5°
DENTAL ANALYSIS			
U1 TO NA mm	5 mm	9 mm	4 mm
U1 TO SN°	113°	118°	5°
L1 TO NB mm	4 mm	2 mm	0.5 mm
L1 TO MP°	85°	83°	2°
FACIAL ANALYSIS			
E-LINE UL	-2 mm	-1 mm	1 mm
E-LINE LL	5 mm	-0.5 mm	5.5 mm

Table. 1: Cephalometric summary

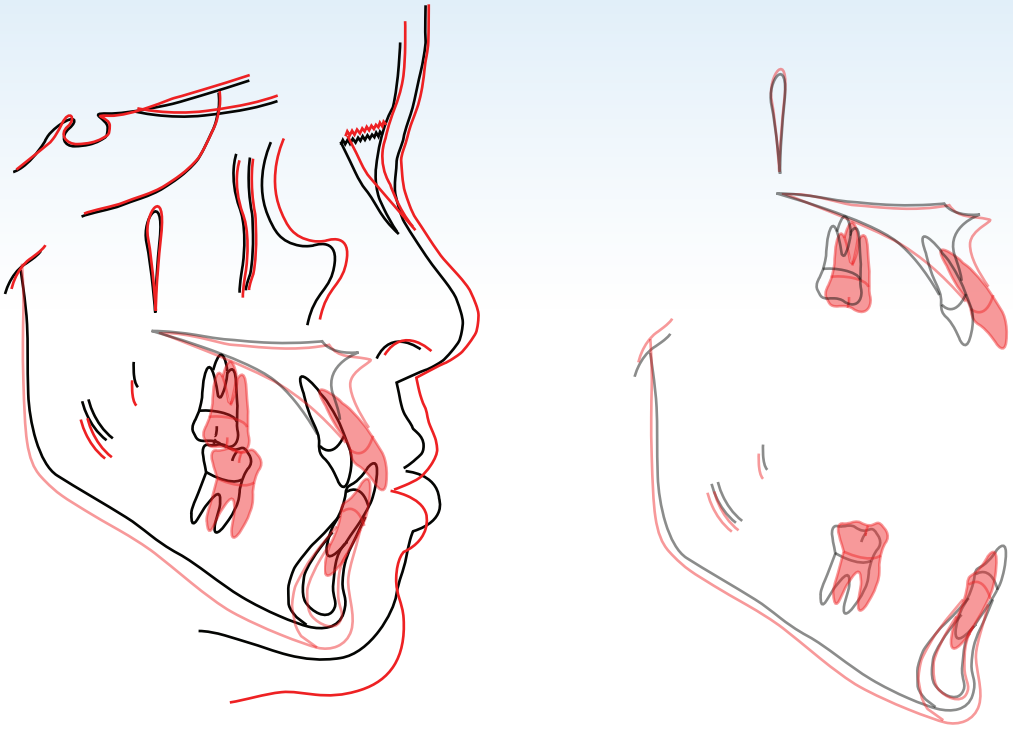

Fig. 10: Superimposed tracings show intrusion of mandibular incisors, flaring of maxillary incisors, and favorable growth of the mandible.

Mandible (*all three planes*):

- A - P : Maintain
- Vertical : Allow for normal expression of growth
- Transverse : Maintain

Maxillary Dentition

- A - P : retract molars and protract incisors
- Vertical : Allow for normal extrusion with growth
- Inter-molar Width : Expand to correct cross-bite and make room for impacted cuspids.

Mandibular Dentition

- A - P : Retract anterior teeth
- Vertical : Tip-back posterior teeth (*extrude and retract*)
- Inter-molar / Inter-canine Width: Maintain

Facial Esthetics : correct mandibular lip protrusion in centric occlusion.

Treatment Plan

Considering the patient's centric relation (*CR*) profile and age, a non-extraction treatment plan with a full fixed orthodontics appliance was indicated (*Fig. 9*). A .022" slot Damon D3MX bracket system (*Ormco*) was selected because of the self-ligated feature for inducing light forces to increase arch width and create space for the unerupted teeth. To maximize the arch expansion effect, bite turbos were used to unlock the bite. Class III elastics were used to correct the A-P discrepancy by flattening the occlusal plane and opening the vertical dimension of occlusion (*VDO*). To enhance the camouflage effect, short Class III elastics with light force were initiated early in the treatment. To compensate for the side effects of Class III elastics, flaring of maxillary incisors and retracting mandibular incisors, low

torque brackets were used on maxillary incisors and high torque brackets were bonded on mandibular incisors. Bilateral extra-alveolar bone screws(*2x12 mm, OrthoBoneScrew®, Newton's A, Inc.*) in the the buccal shelves were needed to achieve a Class I molar relationship in the final stage of treatment. Superimposed cephalometric tracings document the correction of the malocclusion (*Fig. 10*).

Appliances And Treatment Progress

.022" Damon D3MX® brackets (*Ormco*) were bonded on maxillary teeth first because maxillary arch treatment was expected to take more time. NiTi open coil springs were placed to create space for the maxillary canines and the maxillary left second premolar. Bite turbos were bonded bilaterally on the maxillary 1st molars to facilitate arch expansion (*Fig. 11*).

In the 4th month of treatment, the arch wire was changed to .014X.025 CuNiTi and the activation of the NiTi open coil springs was retained. The maxillary incisors were protracted to an edge-to-edge position in the 7th month of treatment, and an anterior bite turbo were bonded on the lingual surface of mandibular central incisors to facilitate overjet and overbite correction (*Fig. 12*).

In the 11th month of treatment, the mandibular teeth were bonded with up-side-down low torque brackets which results in a high torque effect (*Fig. 13*). The maxillary teeth were erupted in the 12th month, and lingual buttons were bonded on the upper left

Fig. 11:
The bite turbos were bonded on bilateral maxillary 1st molar, and NiTi open coil springs were placed to create space for the impacted teeth.

Fig. 12:
The anterior bite turbo were bonded on the lingual surface of mandibular central incisors.

Fig. 13:
The mandibular teeth were bonded with up-side-down low torque brackets which would present high torque effect.

Fig. 14:

Lingual buttons were bonded on #12 and #13. Power chains were attached to these two premolars for correction of rotation. Notice that the impacted cuspids were autu-erupting due to the creation of space.

Fig. 15:

In the 18th month, all impacted teeth were erupted and bonded. Class III elastics (Parrot 5/16, 2 oz.) wearing was reinforced. Overjet was 0 mm.

Fig. 16:

In the 31st month on treatment, two extra-alveolar bone screws were inserted into bilateral buccal shelves to retract the mandibular anteriors.

first and second premolars for correction of rotation (*Fig. 14*); meanwhile, the overjet was 0mm. The importance of wearing Class III elastics (*Parrot 5/16, 2 oz.*) full time was reinforced to both the patient and her parents (*Fig. 15*).

After 8 months of alignment and leveling, OJ was -1mm due to slight flaring of mandibular incisors. Class III elastics force was increased (*Fox ¼, 3.5 oz.*). The maxillary arch wire was changed to a .016x.025 20° pre-torque CuNiTi wire to correct the axial inclinations of the maxillary incisors with labial root torque. A similar archwire was placed in the mandibular arch to achieve lingual root torque of the mandibular incisors. In the 31st month on treatment, two extra-alveolar bone screws (*2X12 mm, OrthoBoneScrew®, Newton's A, Inc.*) were inserted into bilateral buccal shelves to retract the mandibular anteriors (*Fig. 16*). After 5 months, OJ was corrected to 2 mm. In order to improve the posterior occlusion, the mandibular arch wire was cut until 3-3

Fig. 17:

In the 34th month, the upper archwire was sectioned distal to the cuspids. Light vertical elastics (2 oz) were used for final detailing.

and continuous vertical elastics (*Ostrich ¾, 2oz.*) were introduced (*Fig. 17*). Appliances were subsequently removed and retainers were delivered after 37 months of active treatment.

Results Achieved

Maxilla :

- A - P : Moved anterior~1-2 mm at A point
- Vertical : Maintained.
- Transverse : Maintained.

Mandible :

- A - P : Anteriorly and inferiorly with growth
- Vertical : Increased
- Transverse : Maintained.

Maxillary Dentition :

- A - P : Increased ~4 mm.
- Vertical : Molar extruded ~ 1-2 mm.
- Inter-molar Width : Increased ~1 mm

Mandibular Dentition :

- A - P : Maintained.
- Vertical : Molar extruded ~ 2-3 mm.
- Inter-molar Width : Maintained.

Facial Esthetics :

- Improved by protraction of the upper lip and retraction of the lower lip.

Retention

The upper 2-2 and lower 3-3 fixed retainers were bonded on every tooth after the finish records were obtained (*Figs. 4-6 and 8*). An upper clear overlay retainer was delivered, and the patient was instructed to wear it full time for the first 6 months and nights only thereafter.

Final Evaluation of Treatment

The ABO Cast-Radiograph Evaluation was scored at 34 points indicating a finished occlusion that may be acceptable for a board case because of the difficulty of the malocclusion (*DI=54*). A DI-CRE-P&W comparative table is proposed that weights an acceptable finish to the initial severity or complexity of the malocclusion (*DI score*). Based on Table 2, a CRE score of up to 34 points is acceptable for a malocclusion with a DI of 54. The major discrepancies in the finished occlusion (*Fig. 6*) were marginal ridge discrepancies and occlusal interdigitation due to the tip-back mechanism for Class III correction.

Treatment timing is crucial for Class III correction. In review of the whole treatment sequence, fixed

DI	CRE	P&W
10-19	≦26	≦ 12
20-29	≦30	≦ 12
30-39	≦34	≦ 12
40-49	≦36	≦ 12
50-70	≦38	≦ 12

■ Table 2: Discrepancy Index, Cast Radiographic Evaluation, and Pink & White score comparative table (Chang C. Advanced Damon Course No. 11: DI and CRE, Beethoven Podcast Encyclopedia in Orthodontics 2011, Newton's A Ltd, Taiwan)

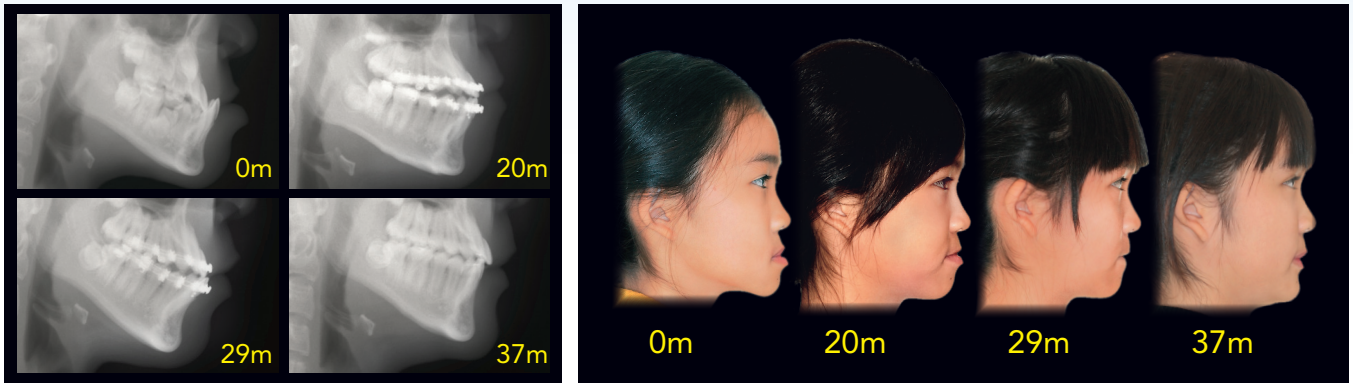

Fig. 18 &19: The changes of anterior teeth inclination and later profile in treatment progress.

appliance therapy could have been delayed. It would have been better to use phase I treatment with removable appliances for correction of anterior cross bite and expansion of maxilla during the early mixed dentition, and delay the full fixed appliance (*phase II*) until all 2nd molars had erupted.

Skeletally, the patient showed a favorable growth pattern, without excessive forward mandibular growth. Besides, the growth of her nose and the advancement of the lips improved facial harmony (*Figs. 18 and 19*). However, the remaining growth potential of her mandible needs to be closely followed into the adult years.

Discussion

In treating young Class III patients, correct diagnosis, appropriate treatment timing and treatment mechanics have long been challenging, due to unpredictable growth and development. However, the following indicators suggest a favorable prognosis: 1. an orthognathic profile in CR position (*Fig. 2*), 2. a functional shift, 3. a low to average mandibular plane angle, 4. no open bite, and 5. no severe crowding.[1] According to Lin's Three Rings Diagnosis,[2] a Class III patient, who has an orthognathic profile in CR position, usually has a favorable prognosis with a conservative treatment.

In general, treatment timing should be delayed until the end of puberty for severe skeletal Class III patients. For the present patient, maxillary deficiency was noted when determining treatment timing. Compared with good mandibular development, the anterior crossbite has resulted in a severe space deficiency in the maxilla. Subsequently, bilateral maxillary cuspids were impacted. The exaggerated Curve of Spee and deep overbite may worsen as growth continues, so early orthodontic intervention was indicated to decrease the complexity of future treatment. However, one of the main disadvantages of early treatment with fixed appliances in late mixed dentition is prolonged treatment time.[3] Waiting of eruption of 2nd molars often exhausts the patients' patience and the family may request premature

termination of treatment with a compromised result. The CRE score of 34 for the present patient could have been improved to the usual board standard (<*26 points*) with about 6 more months treatment with fixed appliances.

When dealing with jaw relation problems in children, two phase orthodontic treatment is often recommended.[4] Phase one treatment addresses the anterior crossbite and deficient maxillary width development. An appropriate appliance might be the D-gainer of Damon System, in combination with maxillary arch expansion (*Fig. 20*).[5] The mechanics of the D-gainer is to expand the arch with light continuous force delivered with passive self-ligated brackets, high-tech CuNiTi wires, and NiTi open coil springs. [6] The use of NiTi open coil springs can create spaces easily and efficiently (*Fig. 21*).[7] This approach usually requires 9 to 12 months to reach phase one treatment goals. After completion of the phase one treatment, the patient is monitored for growth pattern, particularly with regard to mandibular prognathism. Phase two treatment starts after eruption of the 2nd molars. This stage of treatment is simplified because the crossbite and maxillary width deficiency were corrected in Phase I. Compared with early fixed appliance treatment in mixed dentition, two phase treatment can be more effective to manage treatment time. With the patients' active participation, ideal treatment results can be more easily achieved for developing malocclusions that require interceptive (*Phase I*) and definitive (*Phase II*) treatment.

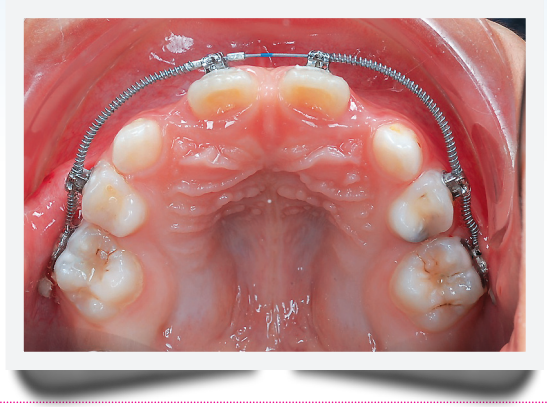

Fig. 20:

The D-gainer of Damon system, a simple 2x4 or 4x2 fixed appliance, is used to correct anterior crossbite and expand the maxillary arch combined with open coil springs in the same time.

Fig. 21:

Creation of space by NiTi open coil springs was easy and efficient. Bilateral impacted cuspids were auto-erupted after 12 months of active treatment.

Another important factor was the mechanics of the treatment. To correct the A-P discrepancy and crowding, extraction was a treatment option. Sarver[8] has expressed concern that extraction in young patients increases buccal corridors or at

least reduces the possibility of improving them. In view of the considerable growth potential, non-extraction treatment is indicated. For arch expansion and correction of the A-P discrepancy, a passive self-ligating system with Class III elastics was used.[9] Extra-alveolar miniscrews may be applied if intermaxillary elastics fail to achieve the desired result.[10]

With the Damon system, auxiliary appliances are not necessary to relieve space deficiency.[11] Continuous light-force mechanics generate alignment from canine to molar associated with a lateral expansion of alveolar bone. Mikulencak's[12] thesis compared the amount of arch expansion between rapid maxillary expansion and Damon system alignment. He found no difference in the amount of molar tipping between the two methods indicating that the maxillary arch can be expanded with light force.[12]

Bite turbos for Class III treatment in numerous ways: 1. protect the enamel from bracket wear or accidental debonding, 2. improve the effect of light wires on arch development, 3. improve the effect of early light elastics for A/P, vertical and transverse corrections, and 4. may have a positive impact on the correction of excessively low or high mandibular plane angles (*brachy-facial or dolichofacial patients*).[13] For the present patient, using posterior bite turbos in the beginning of treatment disarticulated the arches, allowing freedom for tooth movement and arch expansion (*Fig. 11*). In the 7th month of treatment, the anterior bite turbos were bonded on the lingual surface of the mandibular central incisors to facilitate crossbite correction and serve as a vertical stop for overbite (*Fig. 12*). The Curve of Spee was flattened as the molars extruded. Proper torque control is challenging with extensive Class III elastics therapy. Selection of brackets with varying torque levels allows rectangular leveling wires to deliver differential moments as needed early in treatment. There are times, however, when a rectangular archwire fails to provide adequate torque, so it is advisable to use a .016x.025/.019x.025 pre-torqued Ni-Ti® (*20° of torque*) wire to assist in developing

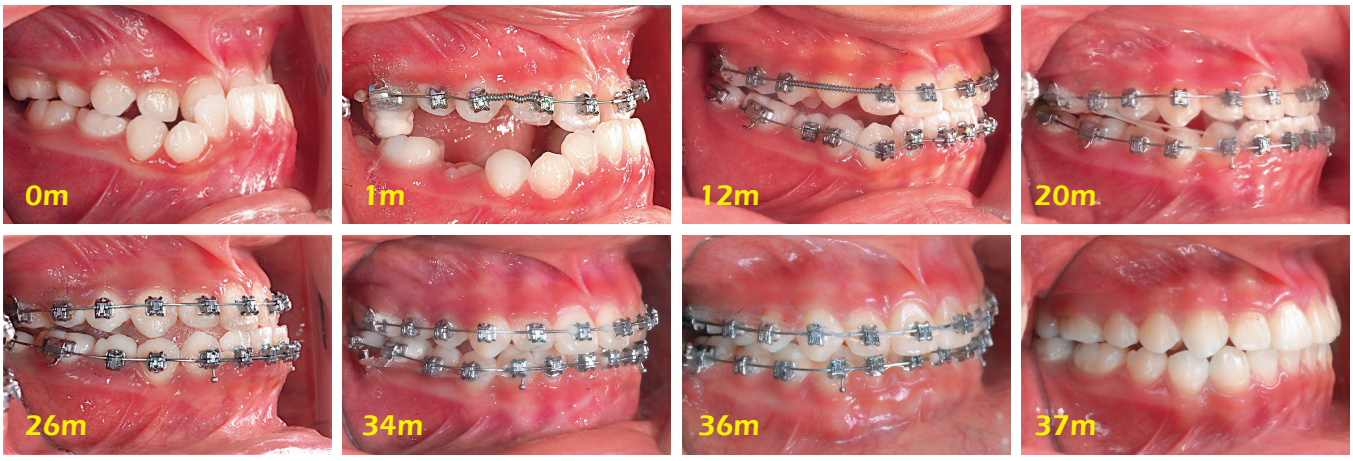

Fig. 22: Progress of A-P discrepancy correction. Notice the torque control of maxillary and mandibular anteriors.

a favorable facial root torque.[13,14] For the present patient, low torque brackets on the maxillary teeth, high torque brackets (*low torque brackets bonded up-side-down*) on the mandibular teeth, and a .016x.025 pre-torqued Ni-Ti® wire were applied. Even this, the torque of maxillary incisors was changed from 112° to 118°, and from 85° to 83° for mandibular incisors. The result was not ideal because of Class III mechanism but acceptable, as documented in Fig. 22.

Conclusion

Treatment timing is crucial for young Class III patients. Early intervention in late mixed dentition with a full fixed appliance Damon system, in combination with intermaxillary elastics and extra-alveolar bone screws, effectively manages the problem. However, phase one treatment with removable and/or limited fixed appliances can correct the abnormal growth pattern, allowing a shorter period of fixed appliance treatment after the second molars erupt. The latter approach avoids the patient 'burn-out' associated with excessive treatment time, and allows the clinician to achieve a better result by retaining patient cooperation until detailing is completed.

Acknowledgement

Thanks to Tzu Han Huang for proofreading this article.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 54

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 = 22

OVERBITE

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

Total = 5

ANTERIOR OPEN BITE

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

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 6

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 3

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 3 x 1 pt. = 7

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 8

OTHER (See Instructions)

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

Total = 4

IMPLANT SITE

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

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

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

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

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

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

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

Total =

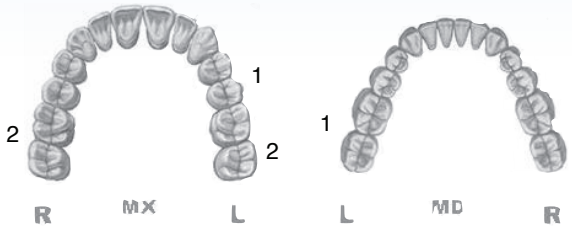
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 34

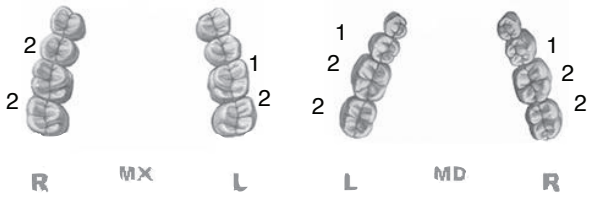
Alignment/Rotations

6



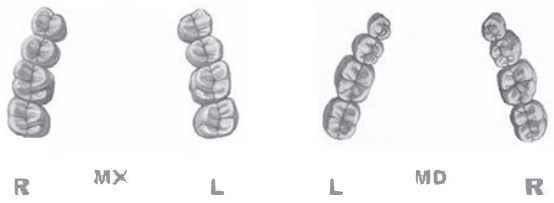
Marginal Ridges

17



Buccolingual Inclination

0

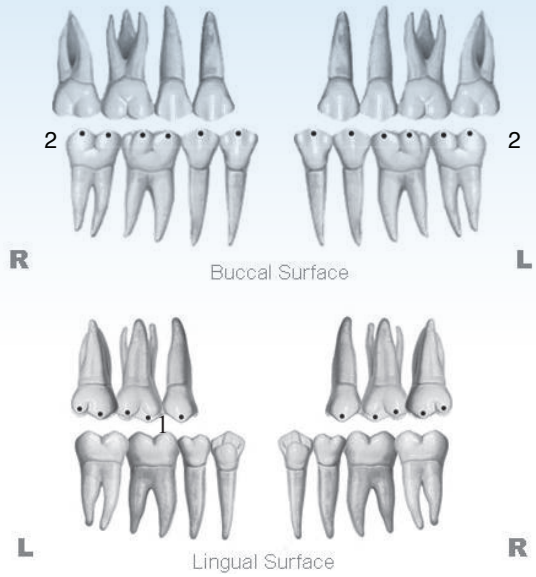


Overjet

1

Occlusal Contacts

5

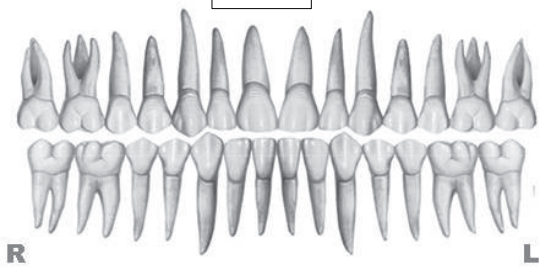


Occlusal Relationships

4

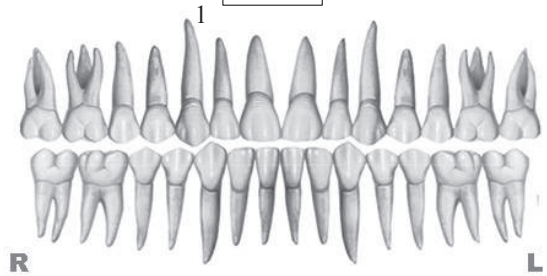
Interproximal Contacts

0



Root Angulation

1



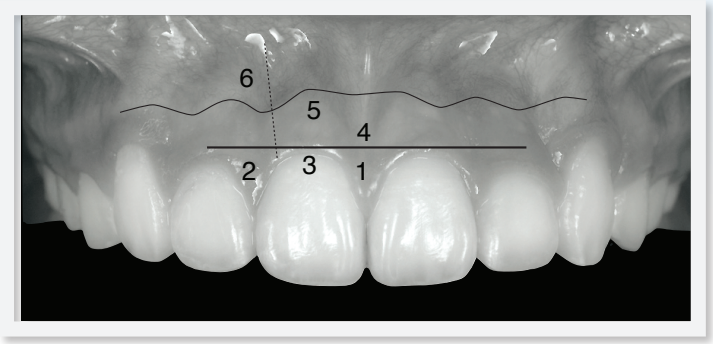
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 3

1. Pink Esthetic Score

Total = 2

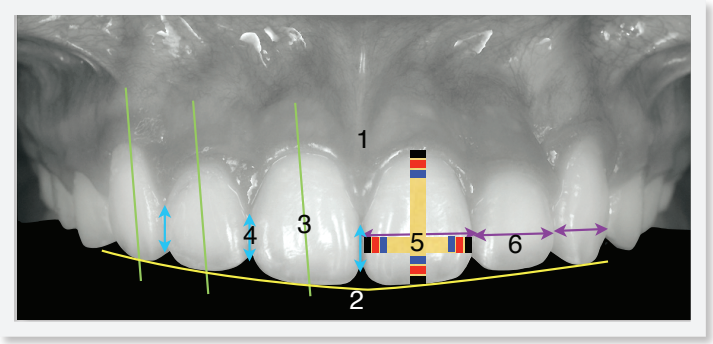


1. Mesial Papilla	0	1	2
2. Distal Papilla	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 1



1. Tooth Form	0	1	2
2. Mesial & Distal Outline	0	1	2
3. Crown Margin	0	1	2
4. Translucency (Incisal thrid)	0	1	2
5. Hue & Value (Middle third)	0	1	2
6. 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

IBOI Pink & White esthetic score

1. Pink esthetic score

The gingival response to an anterior esthetic evaluation is assessed by the Pink Esthetic Score (*PES*) from clinical photography according to six variables scored from 0→2:

1. Mesial & distal papillae,
2. Keratinized gingiva,
3. Curvature of the gingival margin,
4. Level of the gingival margin,
5. Root convexity(torque),
6. Scar formation.

1. The mesial and distal papillae are assessed for a complete papilla (*score 0*), incomplete papilla, (*score 1*), or absence of a papilla(*score 2*).

2. The keratinized gingiva is scored by the thick biotype (*score 0*), thin biotype (*score 1*) or absence of the keratinized gingiva (*score 2*).

3. The curvature of the gingival margin, also defined as the line of emergence of the gingival margin, is evaluated as being identical to comparative teeth (*score 0*), slightly different (*score 1*), or markedly different (*score 2*).

4. The level of the gingival margin is scored by comparison to the contralateral tooth in terms of an identical vertical level (*score 0*), a slight (≦ *1 mm*) discrepancy (*score 1*), or a major (≧ *1 mm*) discrepancy (*score 2*).

5. The root convexity (*labial prominence*) combines three additional specific soft tissue parameters as one variable: Normal labial prominence (*score 0*), Bulky, gum overgrowth (*score 1*), depressed concavity or gum recession (*score 2*).

6. The scar formation is scored by the absence of scar (*score 0*), partial presence (*score 1*), and apparent presence (*score 2*).

2. White esthetic score

The white esthetic score can be separated into anteriors segment evaluation and single one from clinical photography. For micro-esthetic, six variables scored from 0→2:

1. Midline,
2. Incisor curve,
3. Axial inclination,
4. Contact area,
5. Tooth proportion,
6. Tooth to tooth proportion.

For single crown, there are also six variables:

1. Tooth form,
2. Mesial & distal outline,
3. Crown margin,
4. Translucency,

Dr. Bill Su, Director, Newtons Implant Center

5. Hue & Value,

6. Tooth proportion.

For micro-esthetic score:

1. The midline: upper midline equal to lower midline (*score 0*), midline off <3mm, (*score 1*), or midline ≥ 3mm (*score 2*).

2. The incisor curve is scored by smooth curve (*score 0*), uneven curve (*score 1*) or missing/ crowding dentition (*score 2*).

3. The axial inclination, align with standard angulation 5°, 8°, 10° : (*score 0*), slightly different: (*score 1*), or crowding/spacing: (*score 2*).

4. The contact area, the ratio of the contact area to crown length from central incisor to canine are 50% : 40% : 30% (*score 0*), un-symmetry of the contact area on right and left anterior segement (*score 1*), slight prolong of contact area (*score 2*)

5. The tooth proportion: For upper incisors, following the ratio of 1 : 0.8 (*score 0*), shorter crown length (*score 1*), longer crown length (*score 2*).

6. Tooth to tooth proportion, following the golden proportion (*1.6:1:0.6*): (*score 0*), a slight discrepancy (*score 1*), missing/crowding: (*score 2*). White esthetic score for single restoration:

White esthetic score for single restoration:

A score of 2, 1, or 0 is assigned to all six parameters. Thus, in case of an optimum implant/tooth restoration, a minimum total WES of 0 is recorded. All six parameters are assessed by direct comparison with the natural, contralateral reference tooth, estimating the degree of match or eventual mismatch. In the case of an optimum duplication of the esthetically relevant features inherent to the control tooth, a minimum WES score of 0 is possible.

3. Implant position

An evaluation of the recovery and result of an implantation requires an assessment of gingival esthetic change after surgery and prosthesis design. (*the IBOI Pink & White Esthetic Score*). Implant position and abutment selection are also major concern for esthetic result. We add these two items into IBOI esthetic score. (*the IBOI Implant-Abutment Transition & Position Analysis: 1. Implant position. 2. implant/ abutment/prosthesis connection.*).

Implant position: there are five keys we should notice when implant placement during surgical procedure:

1. M-D position.

2. B-L position.

3. Depth.

4. Angulation.

5. Distance to adjacent anatomy.

IBOI Pink & White Esthetic Score

Total Score: = ____

1. Pink Esthetic Score

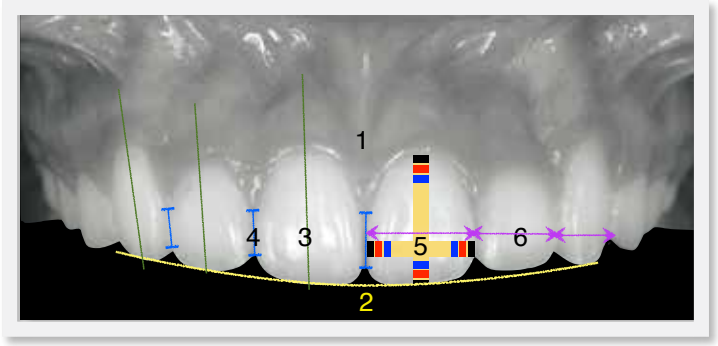
Total = ____

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)

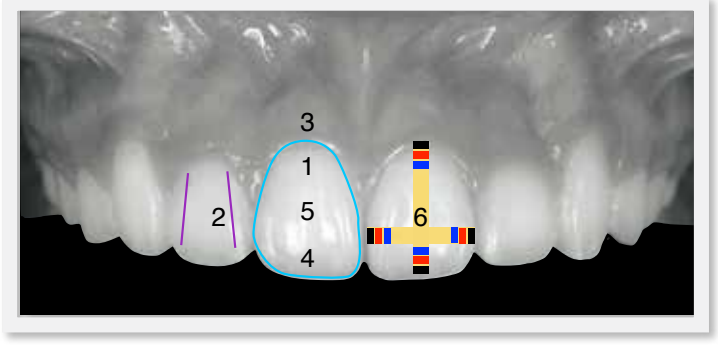
Total = ____



1. Midline	0	1	2
2. Smile arc	0	1	2
3. Axial inclination	0	1	2
4. Contact area	0	1	2
5. Tooth porportion	0	1	2
6. Tooth to tooth proportion (1.6:1:0.6)	0	1	2

2. White Esthetic Score (for Single-implant)

Total = ____



1. Tooth Form	0	1	2
2. Mesial & Distal Outline	0	1	2
3. Crown Margin	0	1	2
4. Translucency (Incisal thrid)	0	1	2
5. Hue & Value (Middle third)	0	1	2
6. Tooth Proportion	0	1	2

We will discussion as follows.

1. M-D position, drilling hole always keeps it in the center of designed crown (*score 0*), shift to one side (*score 1*), close and touch to adjacent tooth (*score 2*).

2 B-L position, it's important to preserve 2mm buccal bone thickness after implant placement(*score 0*). If the buccal bone plate is less than 2mm, the option are: (*a*) place the implant more lingually, (*b*) choose a smaller diameter implant fixture, and/or (*c*) augment buccal bone with GBR procedure to improve buccal bone thickness. The buccal bone plate exists and less than 2mm (*score 1*) and there is no buccal bone plate (*score 2*).

3. Depth, the implant fixture should be placed 3mm below the future crown margin (*score 0*), sulcus depth 2mm or > 4mm (*score 1*), and deeper than 1mm or > 4mm (*score 2*).

4. Angulation, the implant axis should be parallel with the adjacent teeth (*score 0*). It's important to place guide pin and take peri-apical X-ray film to check the axis before implant insertion. Especially in orthodontic case, after opening space, the patient should be referred for X-ray taking to check the root axis of the adjacent teeth. If the root apex are too close, it's difficult for surgeon to insert the implant without damage the root apex. The tilted angulation is between 8 ~ 15 degree (*score 1*), more than 15 degree (*score 2*).

5. Distance to adjacent anatomy, for single implant, fixture should be at least 1.5mm away from adjacent teeth to preserve the proximal bone level (*score 0*), less than 1.5mm (*score 1*), touch to adjacent tooth or other important anatomy (*score 2*).

4. Implant/abutment/prosthesis connection

Implant-abutment transitional contour: there are nine factors would affect final esthetic result:

1. *Fixture cervical design.*
2. *Platform switching.*
3. *I-A connection type.*
4. *Abutment selection.*
5. *Screw hole position.*
6. *Marginal bone loss.*
7. *Sulcus height.*
8. *Modified gingival contour.*
9. *Crown margin fitness.*

We scoring the last four items.

1. Fixture cervical design:
   For esthetic consideration, we can select bone level implant which has no smooth collar on the cervical portion of the fixture.

2. Platform switch: Following as below

3. I-A connection type
   (*E: external connection, I: internal connection*):
   For example: EZ Plus implant has platform switching design, which maintains crestal bone, and in addition, it incorporates an 11° morse taper, producing a conical seal which forms a cold weld between the abutment and the implant. The platform switching and morse taper design prevent microgap movement and allow for a beautifully keratinized tissue response.

4. Abutment selection
   (*S: screw-retained, C: cement-retained*):
   For cement-retained abutment, there are many choices for different situation: one-piece, two-piece, milling, UCLA, customized abutment according to different clinical situations.

5. Screw hole position
   (*B: buccal site, L: lingual site*):
   In this case, screw hole was left on the labial surface of abutment. The screw-retained prosthesis will cause un-esthetic appearance because of obvious screw hole while patient smile.

6. Marginal bone loss:
   There is no bone loss at the time of crown delivery (*score 0*). According to ICOI, Consensus conference meeting, 2007, defined the criteria of successful implant as:
   a. *No pain or tenderness upon function.*
   b. *0 mobility.*
   c. *<2mm radiographic bone loss from initial surgery.*
   d. *No exudates history. < 2mm bone loss at the time of crown delivery (score 1), and more than 2mm bone loss (score 2).*

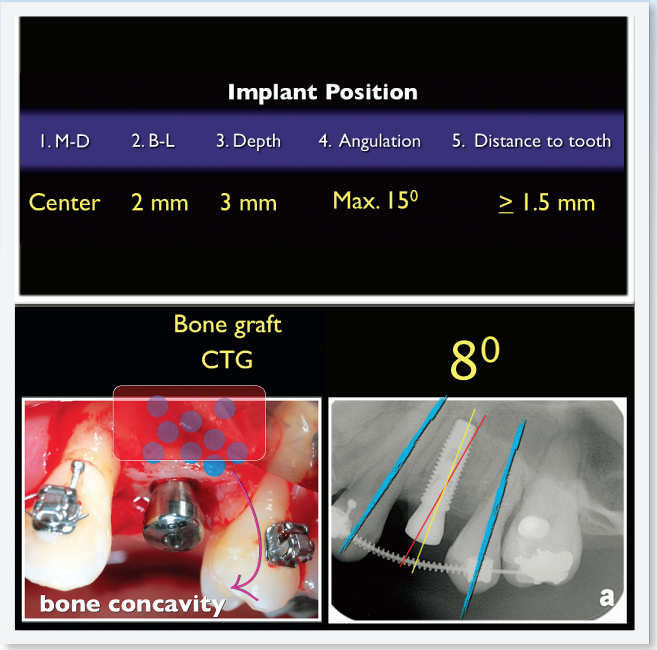
7. Soft tissue height: The ideal sulcus depth around implant was about 3mm for biologic width (*score 0*), less than 3mm (*score 1*), more than 3mm (*score 2*).

8. Modified gingival contour: If papillae are insufficient and caused the dark triangle condition, the CAD/CAM customized abutment can be useful to the move the crown emergence close to the natural teeth to achieve the best interproximal contact. This design will insure us to regain the interdental papilla (*implant crown interproximal contact measured to the crestal bone of adjacent teeth is less than 5mm the papilla will be restored 95% of the time*) to ensure papilla comes back. We use papillae height to measure the modified gingival contour: 90% papillae fill (*score 0*), papillae less than 100% fill (*score1*), no papillae (*score 2*).

9. Crown margin fitness: From periapical film, we can check the integrity of crown margin to abutment. 100% fitness (*score 0*), small gap (*score 1*), the crown doesn't sit on the abutment (*score 2*).

IBOI Implant-Abutment Transition & Position Analysis

3. Implant Position



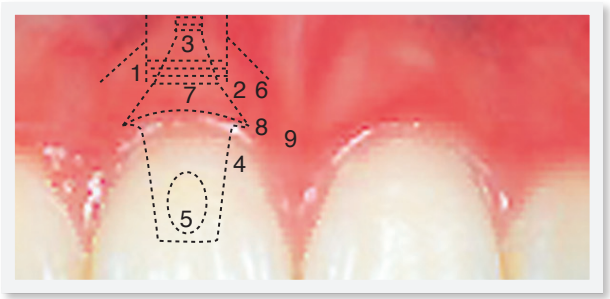
Total = ____

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

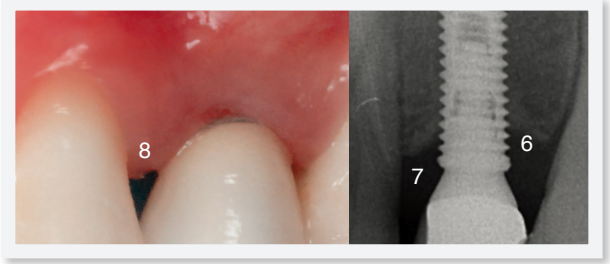
1. M & D (Center)	(0)	1	2
2. B & L (Buccal 2 mm)	0	(1)	2
3. Depth (3 mm)	(0)	1	2
4. Angulation (Max. 15°)	0	(1)	2
5. Distance to Adjacent Anatomy	(0)	1	2

Total = ____

4. Implant/Abutment/Prosthesis Connection



E:external connection,
I: internal connection,
S: screw type,
C: cement type,
P: palatal/central,
B: buccal



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			0	1 2
7. Soft Tissue Height			0	1 2
8. Modified Gingival Contour			0	1 2
9. Crown Margin fitness			0	1 2

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			0	(1) 2
7. Soft Tissue Height			0	(1) 2
8. Modified Gingival Contour			0	(1) 2
9. Crown Margin fitness			(0)	1 2

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湧　傑 YONG CHIEH 105 台北市松山區敦化南路一段2號5樓之1

服務專線：北區(02)2778-8315・中區(04)2305-8915・南區(07)5391701

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2013

時間：9:00am - 6:00pm

07/14 - 07/15, 2013 ……（日、一｜演講與實作 workshop）
08/18, 2013 ……（日｜視訊教學）
09/15 - 09/16, 2013 ……（日、一｜演講與實作 workshop）
10/13, 2013 ……（日｜視訊教學）
11/10 - 11/11, 2013 ……（日、一｜演講與實作 workshop）
12/08, 2013 ……（日｜視訊教學）
01/20-01/21, 2014 ……（一、二｜美國演講）
01/22, 2014 ……（三｜美國可選修的 cadaver workshop）
01/23, 2014 ……（四｜美國可選修的 cadaver workshop）
01/24-01/25, 2014 ……（五、六｜美國演講，畢業典禮）
01/26, 2014 ……（日｜美國可選修的 cadaver workshop）

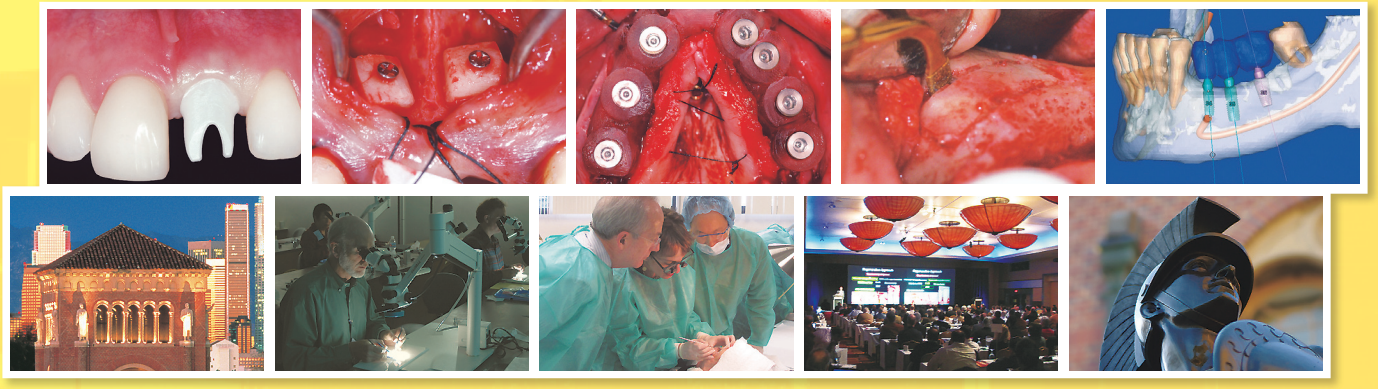
地　點：集思交通部國際會議中心。台北市中正區杭州南路一段二十四號。（2013 年 7 月到 12 月）
Millennium Biltmore Hotel Los Angeles. 506 South Grand Avenue. Los Angeles, CA 90071（2014 年 1 月）

報名費：

台北和美國課程（包含 USC 牙醫學院發出的培訓證書）
- 6/1/13 前報名：美金 $8,500
- 6/1/13 後報名：美金 $9,000

台 北 課 程（不含 USC 牙醫學院發出的培訓證書）
- 6/1/13 前報名：美金 $5,950
- 6/1/13 後報名：美金 $6,450

可選修的 Cadaver Workshops on Bone and Soft Tissue Grafting 課程（不含 USC 牙醫學院發出的培訓證書）
- 9/1/13 前報名：美金 $1,115
- 11/1/13 前報名：每一堂課美金 $1,395
- 11/1/13 後報名：每一堂課美金 $1,595



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•欲知詳情，請與以下單位聯絡•

USC　聯絡人：Julie
E-mail：julie.chen@usc.edu　Web：www.uscdentalce.org
Tel：+1-213-821-5281　Fax：(07) 615-0913

金牛頓藝術科技　聯絡人：葉芳如
Email：rita@newtonsa.com.tw
Tel：(03) 573-5676

A Complex Maxillary Anterior Esthetic Case Study: Interdisciplinary Approach

Dr. Thomas Han

In recent years, implant dentistry has been increasingly influenced by esthetic considerations. In addition to successful osseointegration, the implant restoration must be surrounded by a soft and hard tissue environment in harmony with the existing dentitions. Often, managing complex dental implant patient with demanding esthetics requires a multi-disciplinary approach involving orthodontics, periodontics, dental implantology, restorative dentistry, and dental occlusion. Furthermore, these disciplines must be employed in proper sequence to render a treatment, which is effective, practical and patient oriented.

Frequently the cause of the failure to satisfy the esthetic needs of the patients starts with inadequate examination of the soft and hard tissues surrounding the surgical sites and the natural dentitions. This leads to incorrect diagnosis, which leads to incorrect treatment plan. Incorrect treatment plan combined with selection of inappropriate surgical approaches or techniques will result in disastrous esthetic outcomes. Therefore, proper treatment starts with thorough examination of the patient and the surgical sites. Depending on the patient's circumstances, different treatment options can be considered, but appropriate treatment plans are always derived from the accurate diagnosis of the findings of the examination. Finally, to make the treatment more patients oriented, the treatment plan must be properly sequenced before starting the treatment.

The objective of this paper is first outline the examination and thought process involved in the diagnosis and treatment planning of a complex maxillary anterior case with dentogingival disharmony. Then it will describe and illustrate the rationale and techniques of the treatment approaches used to provide a long-term stable esthetic outcome. A three and a half year follow up is provided.

Components of Esthetic Examination[1-9]

1. Chief complaint: Better attention to this will minimize misunderstanding of patient's needs, and it will help direct the clinician to provide more a patient oriented treatment.

2. Esthetic zone: Often the esthetic areas of the mouth which are not visible to others may still be of importance to a patient. Instead of depending on the lip line of a patient, it is prudent to ask the patient what he or she thinks the esthetic zone is.

3. Tooth position: The labial gingival margin of the tooth being extracted can influence the surgical approach as well as the final outcome.

4. Gingival form: A high scalloped gingival form has a higher degree of interdental papilla shrinkage after extraction than the flatter gingival form.

5. Osseous crest position: Underlying bone level can determine the long term stability of the gingival

Thomas Han, DDS, PhD.

• Adjunct Professor, the UCLA Department of Periodontics
• Member, the American Academy of Esthetic Dentistry

margins of the implant restorations. The osseous position can also influence the surgical incision design and approach.

6. Biotype of periodontium: A thicker gingiva or biotype over implant restorations have lower chances of recession and are more stable. If the surgical site has thinner biotype, a gingival augmentation may be needed to enhance the biotype, thus increasing the long term stability of the gingiva.

7. Tooth shape: Triangular shaped teeth can result in an increased likelihood of the formation of interdental black triangles after extraction. The reshaping of the adjacent teeth may be necessary to obtain harmony between the implant restorations and the surrounding gingiva.

8. Horizontal deficiency and vertical deficiency: The quantity of soft and hard tissue deficiency in the edentulous ridge, as well as the quality of the gingiva will factor into the selection of the surgical approach.

9. Occlusion: Status of the patient's occlusion, such as the occlusal wear pattern and the presence and absence of canine guidance, can influence the treatment plan.

Patient Dental History and Chief Complaint

The patient was a twenty–eight year old female professional. She did not present any medical contraindication for dental treatments. Previously, she had received five years of orthodontic therapy during which the orthodontist had moved her left canine to the lateral position, resulting in a poor esthetic result. Understandably, she had a high degree of dental anxiety.

The patient's chief complaint was the missing canine, wanting a dental implant as soon as possible. She did not like her "*fang*" like appearance, and she wished to have a "*more even smile*".

Examination and Diagnosis

Following is the diagnosis of the examination findings (*Fig. 1*):

1. Dento-gingival asymmetry due to the low gingival level of the right maxillary primary lateral incisor and the high gingival level of the left maxillary canine.

2. A thin biotype over the left canine in the lateral position, which may or may not need correction depending on the treatment approach.

3. Bony concavity in the apical area of the edentulous ridge, which may result in fenestration with implantation.

4. Missing tooth in canine position, the chief complaint of the patient.

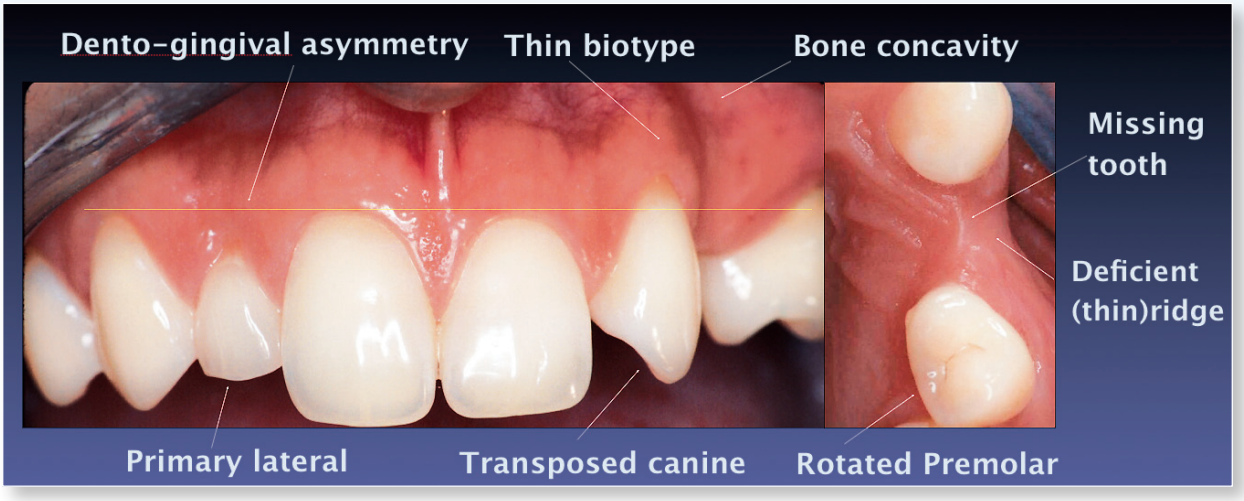

Fig. 1: Diagnosis of findings of the examination

5. Relatively thin edentulous ridge crest with a slight horizontal deficiency.

6. Rotated left maxillary first premolar, resulting in a tight space for implant placement (*Fig. 2*).

7. Left Maxillary canine transposed to the lateral position with high gingival margin. This caused a "*fang*" like appearance and was the major cause of the dento-gingival asymmetry.

8. Retained right primary lateral with severely resorbed roots (*Fig. 3*). However, the problem is not symptomatic.

Whether these items are addressed in the treatment plan is decided only after discussion with the patient.

Treatment

1. Create gingival harmony

2. Restore the missing tooth

3. Provisionalize as soon as possible

4. Create dental symmetry

5. Provide esthetic dento-gingival harmony in the final restorations

Visualizing the final outcome mentally or with the help of computer imaging is helpful in formulating the treatment plan. Also, the treatment objective should accommodate any "*special requests*" of the patient if at all possible. The motivation behind this patient's seeking of dental care was her wedding in 6 weeks. She is looking forward to a long honeymoon, and due to her age, she is planning to become pregnant as soon as possible. She did not want any treatment to interfere with pregnancy and understandably, she did not want any removable provisionals. Furthermore, due to her busy schedule and the long distance drive to the clinic, she wanted

Fig. 2: Implant site

Fig. 3: Retained primary lateral

the treatment completed with as few visits possible. Finally, due to her high dental anxiety, she was very concerned of the possibility of dental pain during the treatment.

Treatment Options

Basically, there were two treatment options available for this patient to achieve dento-gingival harmony, as well as the other treatment objectives. One involved an orthodontics approach while the other was a surgical approach.

In the orthodontic approach, the left canine will be repositioned to the canine site and the premolar will be rotated back to the proper position. Gingival leveling will be done concurrently. In addition, a dental implant will be placed in the lateral position. This approach can be considered conservative and non-surgical. However, in consultation with orthodontists, the repositioning of the canine is not always predictable. In addition, in this case the patient had a strong objection to this approach due to her time constraint and her negative past experience with orthodontic treatment.

In the surgical approach, the missing tooth can be replaced with a dental implant placed in the canine position. This can be accomplished in either a one or two stage implant surgery approach. The missing tooth can also be replaced by providing a fixed partial restoration from transposed canine in lateral position to the rotated premolar. However, the patient preferred an implant. The gingival symmetry problem can be corrected surgically by performing a root coverage procedure over the transposed left canine. The ridge deficiency of the canine site can be corrected with soft or hard tissue grafting, either in a delayed approach or simultaneously with the placement of the implant. The right primary lateral can either be removed or retained depending on the patient's preference, and the dental symmetry problem can be corrected with composite reshaping

or porcelain restoration. Provisionalization can be handled with either a removable or a fixed type.

Of these two approaches, the surgical approach was more appropriate for the needs and requests of the patient. Thus it was selected as the preferred treatment.

Treatment Plan (Surgical approach)

After considering these treatment options with the patient and her restorative dentist, the following surgical approach was selected as the one that best met the patient's needs and requests (*Fig. 4*):

1. Missing tooth: A Dental implant will be placed in a one stage surgical approach.

2. Deficient ridge: A ridge augmentation will be done simultaneously with a "*rolled*" soft tissue graft.[10-11]

3. Bone fenestration: Allograft bone with a resorbable membrane will be used to correct the anticipated fenestration over the dental implant.

4. Retained primary lateral: It will be kept and maintained for the present time.

5. Dental symmetry: The retained lateral and transposed canine will be reshaped with composite initially. The final restorations in porcelain will be performed at later date.

6. Gingival symmetry: The high gingival margin over the canine will be corrected with root coverage surgery, and the low gingival line of the retained lateral will be corrected with minor gingival crown lengthening.

7. Provisionalization: A denture tooth will be bonded to the rotated premolar. An immediate provisionalization over the implant can also be considered.

At first glance of the edentulous ridge, there seems to be a likelihood of a dehiscence of the implant due to the narrowness of the ridge. This would make this case unsuitable for a one staged approach. However, once a new gingival margin is created at a more coronal position on the transposed canine, the proper apical position for the implant placement is

Fig. 4: Diagram of the surgical and restorative treatment plan

much more apical than the exiting ridge crest. Thus it is required that a ridge reduction be performed, which will widen the ridge at the crest level and avoid dehiscence at the time of implant placement (*Fig. 5*). A one staged implant surgical approach is now acceptable for this situation. This approach of implant placement allows simultaneous flap management for root coverage of the transposed canine and ridge augmentation of the implant site. The end result is less treatment time and trauma for the patient.

Surgical Esthetic Strategy

Any form of surgical techniques or flap management employed must preserve what gingival architecture is present, if the existent parts are compatible with the final expected gingival esthetic outcome. It is much easier to preserve what is present than recreating what is lost. However, if vertical or horizontal ridge augmentation is needed, it is always advisable to over-build by at least 30% to compensate for the shrinkage that will occur during healing.[12-13] Sometimes "*papillary illusion*" can be created more easily if regeneration and respective techniques are used in combination rather than alone. In planning the surgical outcome of the papilla height, keep in mind the average papilla height that can be achieved for the given situation, so that unrealistic expectations of the surgical outcome can be avoided by clinicians and patients.

Surgical Procedures

1. Creating a new cemento-enamel junction over a transposed canine[14-15]

Many root coverage techniques are available today, but none work on an enamel surface. Therefore, the first step in the root coverage surgery is to create a new CEJ on the canine, creating a harmonious and symmetrical gingival architecture for esthetic purposes. Using a high speed finishing bur, enamel layer coronal to the existing CEJ was removed in a parabolic shape to the dentine layer (*Fig. 6*). It is important that all enamel layers is removed near the line angles to ensure good connective tissue attachment to the grafted tissue. Then, ten percent

Fig. 5:
Amount of ridge reduction required prior to implant placement

Fig. 6: New CEJ created

Fig. 7: Root conditioning with tetracycline paste

Fig. 8: Incision design with interdental papilla intact

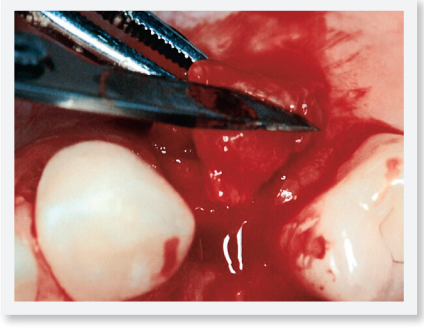

Fig. 9: Epithelium on the connective pedicle is removed

tetracycline conditioning should be done to remove the smear layer (*Fig. 7*). A rough reshaping of the canine to the form of a lateral was done before the opening of the flap to avoid too much debris in the tissues.

2. Flap design for implant placement and "roll" ridge augmentation technique

A vertical incision with the interdental papilla intact was then used to obtain an independent surgical site for root coverage and implant placement with expected fenestration (*Fig. 8*). Preservation of the interdental papilla ensures the conservation of the interdental papillary heights. This enhances the blood supply to the connective tissue graft which will be placed over the denuded root surface. Next, a crestal incision was made on the palatal side to utilize the palatal connective tissue which was rolled over to the labial surface for simultaneous soft tissue ridge augmentation. The epithelium of the connective pedicle was removed prior to rolling it into the buccal pouch (*Fig. 9*). For a single tooth span horizontal deficiency with adjacent normal bone thickness, this "*palatal roll*" is an effective, non-traumatic, and long term stable ridge augmentation technique.[10-11] It also provided 3-4mm thick gingival biotype with harmonious color and marginal stability labial to the implant.

3. Proper implant placement and suturing

Once a new gingival margin has been created at a more coronal position on the transposed canine, the proper apical position for the implant placement can be determined. Since the gingival margin of the canine is usually about 0.5-1mm apical to the gingival margin of the lateral, the correct apical position of the implant is approximately 4mm apical to the newly created CEJ of the transposed canine.

The existing ridge crest is coronal to that position and a ridge reduction was performed before placement of the implant. This provided a wider ridge platform to place the implant into without dehiscence (*Fig. 10*). The angulation of the implant should avoid adjacent roots and should be no more than 15 degrees angulation off from the long axis of the normal root. In addition, Bucco-lingual positioning of the implant must be within the out line of the crown and the mesio-distal position must ensure that there is sufficient room for the interdental papilla (*Fig. 11*). All these precautions will ensure a proper implant emergence profile as well as a hygienic esthetic restoration. Furthermore, in cases of fenestration of the implant fixtures, the implant apex should be placed into solid bone to provide bi-cortical stabilization. After placing the implant in a proper position, a 4mm healing abutment was connected. The exposed implant surface was packed through bone fenestration with allograft bone particles and covered with resorbable membrane to stabilize the particles under the flap. The palatal connective tissue pedicle was folded or "*rolled*" and tucked into the buccal side and stabilized with sutures slightly coronal to the expected final gingival margin, thus compensating for possible recession (*Fig. 12*).

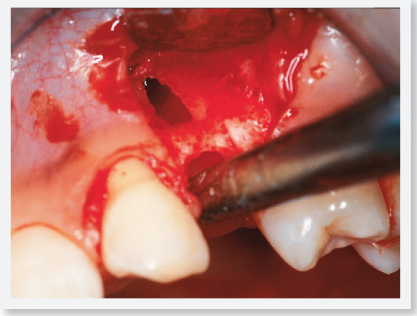

Fig. 10:
Implant recipient site with fenestration but without dehiscence

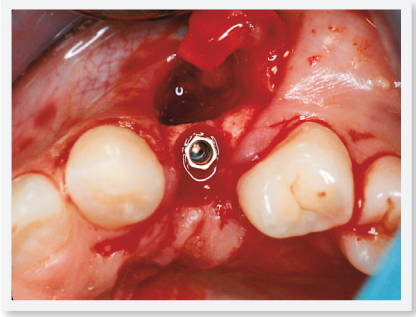

Fig. 11: Occlusal view of implant placement

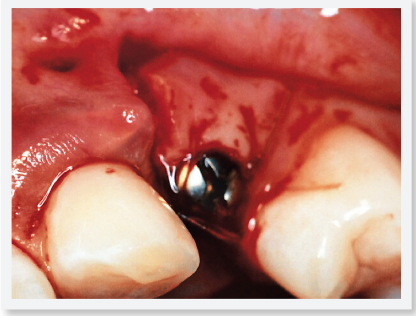

Fig. 12: Palatal tissue rolled and sutured to labial position

4. Root coverage over canine

Once the implant was placed and the flap over the implant is secure, a partial thickness flap was raised with a #15 blade apical to the gingival margin of the canine using the modified tunnel technique.[16]

A vertical incision was added to the distal line angle of the left central incisor to facilitate tunnel flap reflection and connective tissue graft insertion (*Fig. 13*). Through the use of micro-blades, this procedure can be accomplished without vertical incision. Care must be taken to keep in tact the

interdental papilla so that the connective tissue graft placed underneath will have an enhanced blood supply. The recipient site must have sufficient vertical flap release under the papilla so that the connective tissue graft underneath is not displaced apical from the CEJ position during healing (*Fig. 14*). Approximately 0.5 mm thick connective tissue was harvested from the ipsilateral palate. Connective tissue thicker than that will cause an abnormal lump in gingiva. The graft was placed under the recipient flap and secured to the underlying periosteum just under the new CEJ (*Fig. 15*). An outer flap was placed over the connective tissue at the new CEJ level without visible tension.

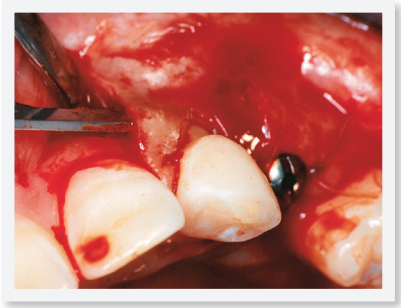

Fig. 13: A tunnel flap reflection with a vertical incision

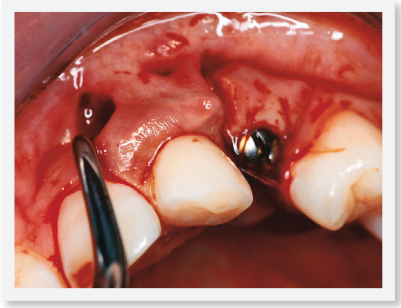

Fig. 14:
Recipient flap with sufficient vertical release under the papilla

Fig. 15: Connective tissue placed under the recipient flap

Flaps were sutured in such a manner that outer lip movement did not result in any marginal flap movement or blanching of the surgical sites (*Fig. 16*). This ensures adequate blood supply to the grafted tissues during healing. A slight gingiectomy over the retained primary lateral was also completed. A severely reabsorbed root was of concern, and only a minimal amount of gingival was removed to lengthen the crown.

Surgical Result

Ten day after the operation, there was good healing without any signs of flap necrosis.

A new viable gingival margin with adequate biotype was present at the new CEJ of the transposed canine (*Fig. 17*). An adequate ridge augmentation labial to the implant was accomplished with a proper margin and contour to provide gingival harmony for the implant restoration (*Fig. 18*). The implant possessed strong primary stability, and it was in a good position to provide implant prosthesis with the proper emergence profile (*Fig. 19*).

There are different approaches and surgical techniques available in treating this situation with similar end results. The advantage of this approach

Fig. 16: Sutured stable flaps for optimal healing

Fig. 17: Ten days post operative healing

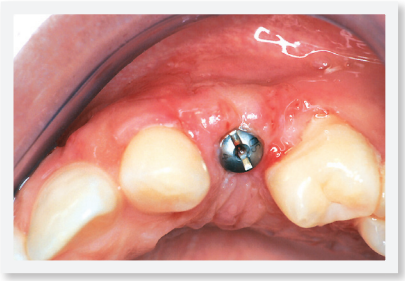

Fig. 18: Ten days healing of the ridge augmentation area

Fig. 19: Ten days healing of the ridge augmentation area

is that with one surgery and minimal discomfort to the patient, root coverage, implant placement with ridge augmentation, and most importantly, the gingival harmony of the patient's maxillary anterior was accomplished.

Restorative Result

Five weeks after the surgery, the retained lateral and altered canine were reshaped with composite. In addition, a denture tooth was bonded to the adjacent premolar over the healing abutment of the implant for a fixed provisional restoration (*Fig. 20*). The palatal side of attached tooth was hollowed out for easy access to oral hygiene. The immediate attachment of provisional to the implant was decided against due to the minimal thickness of the crestal bone surrounding the implant.

The patient returned from her honeymoon, became pregnant soon after, and received a final canine implant restoration from the restorative dentist five months after the surgery. She wanted to postpone the final porcelain restorations to the retained right lateral as well as the transposed canine in lateral position for personal reasons. With her new baby and work, the patient did not return for a follow up treatment until three and a half years later. At this point, dento-gingival harmony of her maxillary anterior was still present (*Fig. 21*). The root coverage and the horizontally augmented ridge were stable with thick biotype. In addition, there were no sign of progressive recession or shrinkage over the three and half year period (*Fig. 22*). The bone around

Fig. 20:
5 weeks after the surgery with fixed provisional restoration bonded over the implant healing abutment

Fig. 21: 3 ½ year follow up with stable dentogingival harmony

the implant was stable at the level of the implant platform (*Fig. 23*). The composite restorations were worn and needed replacing, but again due to her time constraint, the patient wanted to postpone the treatment to a later date. The retained primary lateral also showed increased mobility. The final restorative treatment plan for the patient is the extraction and the replacement of the retained right primary lateral with an implant restoration, replacement of the composite restoration of the transposed left canine with a ceramic restoration, and reshaping of the existing canine implant prosthesis for better restorative harmony.

Summary

In this case study, the examination process,

Fig. 22:
3 ½ year view of the stable root coverage and ridge augmented area

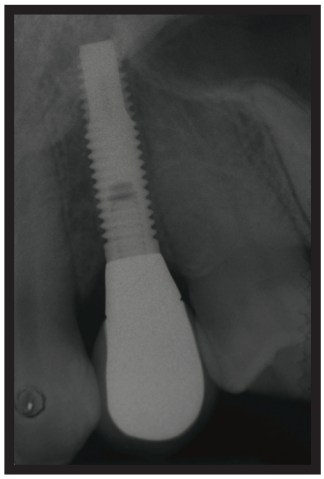

Fig. 23: 3 ½ year radiograph. Bone around the implant is stable

diagnosis, treatment planning and treatment of a complex maxillary anterior case with dento-gingival disharmony was described. Since all treatment starts with the examination of the soft and hard tissues surrounding the surgical sites, it is important to develop thorough examination skill and clinical judgment to derive an accurate diagnosis. Today, with so many innovative surgical approaches and techniques available for dental implant and esthetic treatments, clinicians should be familiar

with the different surgical techniques available in order to select the approach most appropriate for the patient. Respecting the biologic principles and limitations of each procedure will maximize the success rate. Finally, by keeping an opened mind to new approaches, it is easier for clinicians to keep up with the rapid changes taking place in the discipline of dental implantology and esthetics.

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邀請您一起迎接「協同性整合」的新牙科時代，讓我們從植體與矯正的對話出 發，透過整合各科精華，締造集美觀、功能於一身的全方位治療。張醫師相信， 儘管課程內容可能相似，但是貝多芬對於資料的呈現方式不一樣！唯有自己消化 吸收後的整理，才是真正屬於自己的難能可貴的經驗，這就是貝多芬精神！

關於植牙論壇的定位與期許：

1. 將目前眾多植牙演講精華，重新整理過在自己的場合報告
2. 提供訓練平台供學員報告自己的case，從中相互學習。
3. 提升助教的演講技巧，培養新講師群。
4. 作為未來IAOI矯正植專科醫師考試的考前訓練班。

2013年02月22起

每月底週五，上午9:00-12:00

書 視 課 品




2013 Newton's Implant

	日期 (W5)	09:00 ~ 10: 00	11:10 ~ 12:00
		Implant/Ortho. case sharing	Article review
1	2/22	IAOI Implant/Ortho. case 1	Interdisciplinary Treatment Planning 1
2	3/22	IAOI Implant/Ortho. case 2	Interdisciplinary Treatment Planning 2
3	4/26	Special lecturer	
4	5/24	IAOI Implant/Ortho. case 3	Interdisciplinary Treatment Planning 3
5	6/28	IAOI Implant/Ortho. case 4	Interdisciplinary Treatment Planning 4
6	7/26	Special lecturer	
7	8/30	IAOI Implant/Ortho. case 5	Interdisciplinary Treatment Planning 5
8	9/27	IAOI Implant/Ortho. case 6	Interdisciplinary Treatment Planning 6
9	10/25	Special lecturer	
10	11/29	IAOI Implant/Ortho. case 7	Interdisciplinary Treatment Planning 7
11	12/27	IAOI Implant/Ortho. case 8	Interdisciplinary Treatment Planning 8

邱丕霞醫師

南下高雄開業，迄今已逾十五年時間，邱醫師最感受用的，是她在三十五歲開業之初學會矯 正，在四十六歲還沒得老花眼時學會了植牙。邱醫師坦言，在職進修必然造成壓力，它可能來自於 時間、金錢與家庭，畢竟一天只有二十四小時，但終身學習所創造的成就感與報酬，卻讓她覺得當牙醫「真是好玩」，而且將持續下去，謹此與讀者分享。

iAOI

Feedback on the Book "Othodontics"

Hi Chris,

I want to personally thank you and congratulate you. I will anxiously await getting my order accepted next week.

Can't wait to see you soon and to delve into your latest edition.

You are one of our greatest examples of excellence on the entire globe.

Hugs to Shufen!

Appreciated regards, Tom

Dr. Thomas Pitts, DDS,
MSD Founder of the Progressive Study Group

Dear Chris,

Exquisite! Inspirational! Innovative! Elegant! Thought provoking! Just received and cannot find adequate words to describe! Only needs your autograph to be complete.

Looking forward to the digital version, especially with regard to a cutting edge teaching platform.

More congratulations and Warmest hugs!

Ron

Dr. Ronald Bellohusen, DMD

Hi Chris,

Just wanted you to know that I received your book in the mail today. Over my learning in both dentistry and medicine I've read, studied and reviewed many textbooks. You are to be highly commended for your scholarly work. Both you and Dr. Roberts have contributed a great work to the body orthodontic and should be very proud of your work.

All of your case reports were organized, expertly documented and well thought out. You've done a great service to all Damon practitioners by lending your ABO precision to light-force mechanics. Coupled with TADs, you've really helped a multitude of orthodontists, the reach you'll never know, become better practitioners.

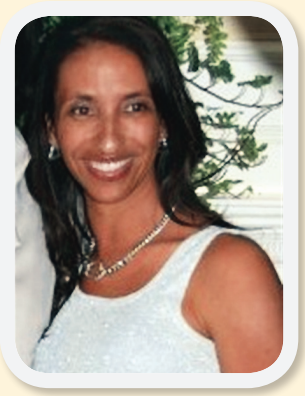
Great work Chris, really great work. Respectfully, - John

John Graham,
DDS,
MD Graham Orthodontics,
Litchfield Park, AZ

Hello Professor,

Hope all is well!! Just purchased the book (*1 of 3 left*). It is a great day and I will also purchase a lottery ticket since I lucked out getting my hands on a copy of your book! Please tell Shufen hello for me.

Your friend and student, Karla Thompson



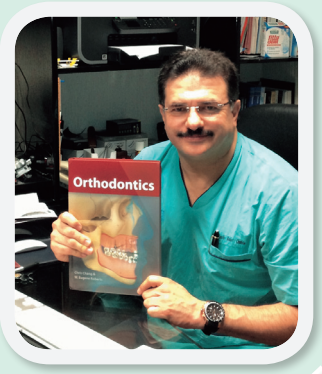
Karla Thompson

DDS, Ortho Smile 360 in Encino, CA

Dear Chris,

Today I received your book. I order it in Amazon on Monday and got it today in México city. Congrats! It looks excellent! I am anxious to start reading it. The only thing is missing....Your autograph!

Best regards amigo, Nasib



Nasib Balut

Mexico

Hi Chris,

Finally we received your amazing book! Elena and I are practicing a lot as you can see in the pictures, we have found that bigger screws are better....

Thank you very much for this fabulous book and for sharing your knowledges with everyone. Very lucky to have you and Shufen with us in the Progressive.

Big hug

Elena and José

Spain

張慧男醫生您好：

我叫蔣德成，Jack Chiang，我是在台灣當完兵之後來美讀書，大學在 University of Taxas at Austin，牙醫在 UTHSC San Antonio 就讀，已在美國華盛頓州執業 12 年。學習植牙也已超過 4 年（曾經在 Carl Misch, Michael Pikos, Dennis Tarnow, Fouad Khoury 等學習過），矯正學習也有 7-8 年（曾經在 Vance Kokich,Sadao Sato 等學習過），目前是使用 Straight wire 及 MEAW technique，還未嘗試過矯正植牙。明年一月會參加 USC 的 Perio Implant symposium，看到張醫師也是講員之一，所以很.高興還會有機會再與張醫師碰.面及交流。

今年在暑假 UCLA 的課程中認識從韓國來的 Dr. Park，間接的知道在我的故鄉台灣也有高水平的牙醫教學者，所以在網上搜尋了有關張醫生的矯正及植牙網站，感到非常的驚嘆張醫師的教學方式，並很有興趣能更多的與張醫師學習。

張醫師的矯正與植牙學會雜誌我已讀過最近兩期，顯然是個很俱學術價值高水平的牙學刊物。真的為台灣能有如此優秀的名師願意付出時間分享牙醫技術及編輯如此國際水準的刊物感到非常高興。兩週前我 在舊金山參加 Stephen Chu （也是 USC 明年 Symposium 講員之一）小班授課時也認識了張醫師的學生之一，馬來西亞來的 Leong Seng Neoh，對張醫師讚譽有佳，呼籲我回台灣一定要去拜會張醫師學習。

今年年底我們一家包括孩子會回台灣與家人親戚團聚，不知回台期間是否有機會能見習張醫師新竹的診所，如果可能的話，有臨床跟診與病例示範的上課機會更好，學費當然是應該的，我同時也想購買張醫師的矯正電子書及視訊。

謝謝張醫師及高老師在牙醫界的奉獻及努力，期待與張醫師的見面與學習。

Sincerely,

蔣德成

Jack Chiang, DDS MAGD, Pullman Family Den stry PLLC
Pullman, WA USA

好久不見,兩位最近好嗎?

很抱歉，自從離開新竹後，一直沒有太多機會能和兩位問候，知道張醫師及高老師的動態消息，大多是我在假日回金牛頓時，從 Winnie 及思涵的口中得知，才能稍加跟上金牛頓與貝多芬的腳步，知道大家最新努力的方向與目標。像最近大家在一個月內以努力不懈的態度，讓最新的賈語錄方能上市，都讓我不時回味起每次與張醫師溝通完的記憶，那種好像知道自己正在做一件非常有成就而了不起的事情時， 整個靈魂都跟著燃燒起來般的熱血！

還有一直要親口向張醫師感謝的，卻一直遲遲不好意思當面說出口的，就是您的簡報理念與教學方式，對當時只有大四、大五的我來說，對自以為擁有口才就會簡報的我來說，那段日子真的是一場又一場的震撼教育，至今還深深的影響我對做簡報的態度，那種成長跟受益，絕對是我從出生至今都從沒想過的經驗。

因此，兩位不僅帶我走入正確溝通與表達的世界裡，也帶我嘗試了自己從來就不曾想接觸過的蘋果電腦，改變了我對科技的認識與體悟。明天起，我即將與朋友前往全世界 Apple Store 巡禮觀摩，目的則是希望看看不同世界的蘋果族群們，都各自用著什麼樣的態度在推廣蘋果電腦，以及如何應用這些時尚而前衛的科技，豐富他們的生活。所以，我將這個旅程命名為「壯遊蘋果」，除了參訪直營店外，也想 透過不同的粉絲平台了解過去的時空，進而將這些經驗與觀察都撰寫 在一個部落格上。

所以想說趁著機會，能向兩位報告我的近況，並謝謝你們抽空閱讀此封信。若是可以，甚至希望張醫師或高老師能給我些不同的建議，讓我擁有與眾不同的角度去觀察這個世界。敬祝身體安康，事事順心。

曾經於金牛頓當過工讀生，目前為「壯遊蘋果」計畫的夢想實踐家。
關於「壯遊蘋果」計畫，可參考網站：http://www.applegrandtour.com/

蔡學欣 敬上

Dear Chris,

Thank you, for considering me in your project. I am highly sensitive to that and, let me tell you, that this project is now fascinating me. I will do my best to prepare something very good, but I need you as my mentor…

I think that with your innate generosity you are ready to provide me with this help I request. Seating beside you at the banquet last night, being in your auric field, allowed me to perceive certain dimensions of your personality which I was not aware of. And I, now, know we are on the same wavelength as regards many things pertaining to life in general. If I said during the lecture that I was an intuitive orthodontist, one has to know I am also, shortly said, an intuitive man. This is not women's privilege right? You know me, if they have that sense…I can have it too…! Sounds like: if he can do it, I can do it !

I am extremely grateful to John for inviting me as it has triggered something within me. Feeling the warmth, kindliness, friendship and sharing spirit animating the group which has taken care of me in Taipei has put forward that I have found people I am really connected to, and this is not something, unfortunately, I have experienced in North America. It is not, either, the spirit animating Europe where everyone is jealous of its privileges. I know what I am talking about as I have lived there. When we meet again, remind me to tell you the story of what happened in Paris 3 years ago. It would be too long to narrate this in this mail. I feel very connected to people like John, you, Sabrina, Rungsi, Leslie and the others I cannot remember the name of.

You tell me I should travel more, this is what I have prepared for in the last 4 years, now Heaven has to help me, as I feel ready. I am,now, in Toronto, waiting for my connecting flight, and let me tell you that in Taipei airport and here in Toronto I have read more than half of the Jobsology book you offered me…You are right, Real artists ship. May be have I joined that fraternity…Future will tell. Thank you for your friendship, I am happy to know I will see you in Orlando.

Jean-René

Dr. Jean-René Van Becelaere practices Orthodontics in Dorval, QC, Canada. He gives his lectures related to Damon system all over the world.

Hi Dr. Chang,

I just want to thank you again for coming to our country and share the wonderful material. The feed back from our customers was amazing (*as you could see with the final standing ovation*). I hope that you had a good time yesterday, visiting our Sao Paulo.

See you in Orlando.

Best regards, Carlos
(and thank you for the book again. I gave it to my wife and she loved it)

Thanks goodness—Yes, dear friend, a standing ovation is very rare and you of all people deserve it—congratulations. The only other time I have seen one in my 36 year career was when Dr. Damon presented the first cat scans to show the roots were not blowing through the bone during 12mm to 14 molar Mx lateral development—that made me cry. So I wish I had been there for yours…

Do you or Shufen have a video of it?? How awesome it would be to show at next years damon forum???

See you soon, Sandra

Feedback on the Book "Jobsology"

高老師您好：

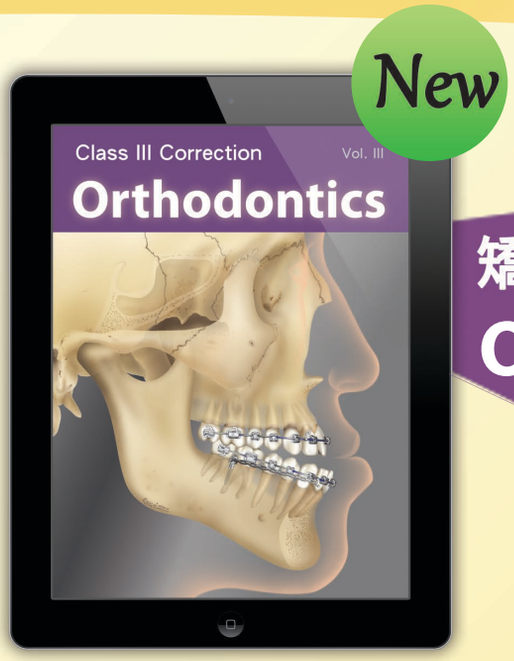
承蒙您的抬愛及團隊精神感染了蔡醫師，讓蔡醫師也與診所的助理們分享了張醫師的用心，及金牛頓的團隊氛圍，今天大家拿到賈語錄時都非常的開心，真的很謝謝您，也辛苦張醫師了，蔡醫師也常讚賞金牛頓的團隊效率，還以此做為勉勵大家應以這樣的精神來服務病人! ~ ~很高興能認識您們。

高雄欣典牙醫 譜聿

我今天拿到張老大賈語錄的簽名結果很多人看到大家都喜歡那個漫畫，都想要一本，我就員工還沒買的都送囉！

感恩 蔡誼德

高雄欣典牙醫



矯正醫學電子書 Vol. III
Orthodontics Class III-Correction

- 多點觸控 & 互動式學習 介面
- 整合圖文、影音、3D模型、投影片等 多媒體
- 隨時標記重點，系統自動整理 筆記
- 課後複習且提供隨堂 測驗

電子書於金牛頓門市安裝，iPad安裝電子書需升級 iOS 5、iBooks 2.0以上版本

矯正醫學電子書
Orthodontics
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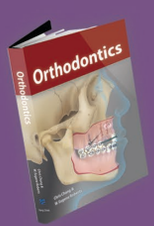

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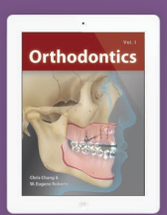

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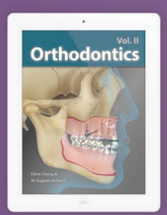

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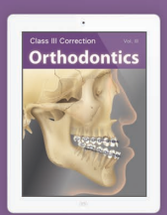
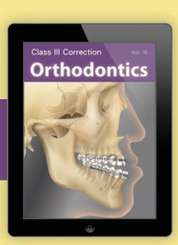


電子書 Vol.III

已經擁有Vol.I及Vol.II，更不能錯過

Orthodontics Class III-Correction



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熱烈預購中！

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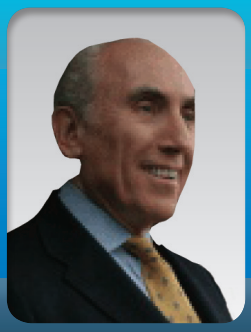


K1 簡報聖經 2012/12/27

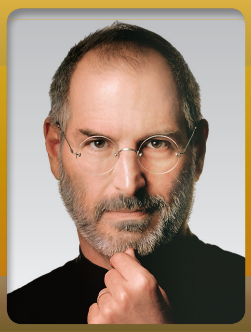
看過太多充滿複雜文字和圖表的幻燈片，聽過就忘了的演講嗎？ Keynote 系列一的演講要教你如何利用 Keynote，製作出令人目眩神迷、印象深刻的電腦簡報。透過小班教學，貼身指導，務必讓你在八小時裡輕鬆掌握 Keynote 的簡報技巧。

學習重點：1.Keynote 操作入門　2. 演講常見十大謬誤　3. 資料視覺化技巧

K2 Dr.Kokich 令人屏息的十大演講秘訣 2013/1/17

Keynote 系列二位各位介紹世界牙醫界的天王講師 Dr.Kokich 的十大演講秘訣，讓您在進階的課程中更加掌握演講設計的關鍵原則，不但讓你知其然，更知其所然！

學習重點：1.Dr.Kokich 十大演講秘訣　2. 準備演講的九個步驟　3. 多媒體影片剪輯



K3 賈伯斯令人目眩神迷的五項演講技巧 2013/3/14

總結我們 Keynote 系列的系列三，我們為大家逐步解析跨界演講大師 Steve Jobs 是如何說出打動人心、價值數十億美金的關鍵故事。透過逐步的分析拆解，要讓您也可以成為獨具魅力的演講人。

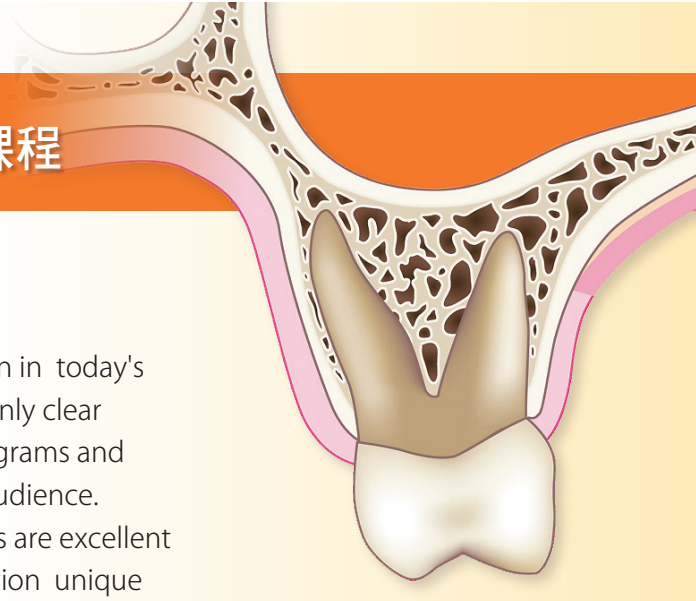
學習重點：1.Steve Jobs 的五項演講技巧　2. 幻燈片的設計概念　3. 幻燈片修改應用

好康

連續報名三堂課，學費再享 9 折優惠！

報名專線：03-5735676　Hours：9:00-17:00　上課地點：新竹市建中一路 25 號 (交大華廈)2 樓

Keynote 高效簡報學習法系列課程



K4 / 5 / 6 簡報繪圖精修課程

2013
11/23-25
Sat-Mon

9am-5pm

預計招生：限額 25 名

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 :

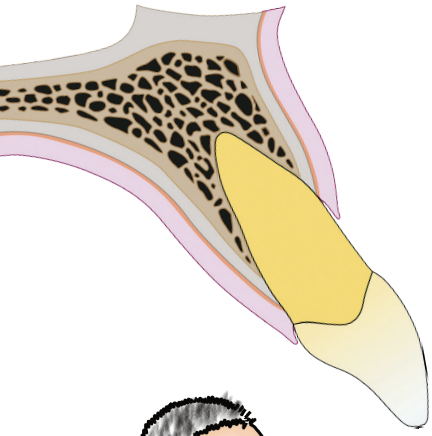
Why will you learn?

- How to use a digital drawing board.
- Design illustration in your Keynote.
- Showcase your own drawing with stunning animation in Keynote.
- Create complicated diagrams using Adobe Illustrator and Photoshop.
- Animation Competition

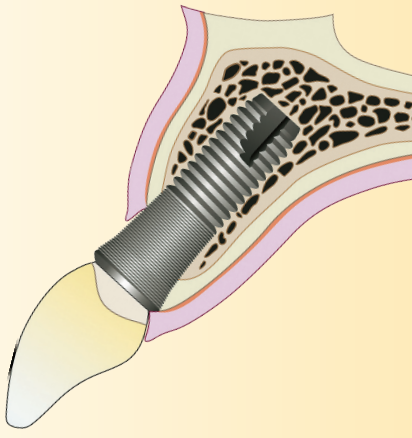
Requirements :

- Mac computer with OS X 10.7 or later
- Digital drawing Tablet (**Wacom** recommended)
- iWork 09'
- Adobe Illustrator CS5 and Adobe Photoshop CS5 (or later version)

Dr. Rungsi Thavarungkul



Make Your Presentation
Unique & Memorable !



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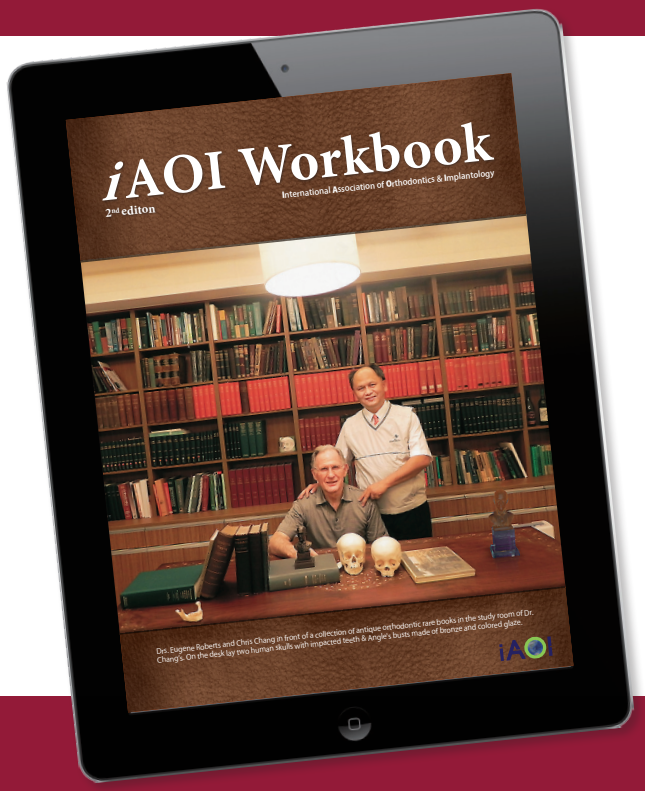

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O rthodontists &
I mplantologists

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

Join the *iAOI*, the future of dentistry!

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. The exam is one hour and the next session will be held on December 9 in the headquarter of Taiwan Academy of Banking and Finance, Taipei, Taiwan.

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.

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.

*International Journal of Orthodontics & Implantology (IJOI) is the official publication of International Association for Orthodontists & Implantologists (iAOI).

iAOI

C-201205 0608-0000

iAOI

時間：12/09 (日) 地點：台灣金融研訓院 2F菁業堂

台北市羅斯福路三段62號

2012 iAOI 年度大會

矯正與植牙的合奏

A Symphony of Orthodontics and Implantology

議程表

Dr. Thomas Han
美國UCLA
牙周病研究所教授

Dr. Kwang Bum Park
韓國連鎖MIR
牙科醫院聯盟負責人

林錦榮 醫師
台北林錦榮
齒列矯正中心負責人

張慧男 醫師
新竹貝多芬
齒顎矯正中心負責人

08:00	**iAOI Exam**
09:10	Registration
09:30	Topic: **Anterior Aesthetic Nightmare - Why do they occur? How to Avoid them?**
10:20	Break
10:40	Topic: **Hard Tissue Defect - How to solve it? Is the result ideal?**
11:30	Diplomate Oral Presentation 1 & 2
12:10	Lunch
13:00	Topic: **Ortho-Implant combined treatment-I**
13:50	Diplomate Oral Presentation 3 & 4
14:30	Break
15:00	Diplomate Oral Presentation 5 & 6
15:40	Topic: **Ortho-Implant combined treatment-II**
16:30	Closing comments and Certificate ceremony

報名費

會員
NTD **2,500**

非會員
NTD 6,000

- 非會員向昇基、湧傑團報可享4,500元優惠價。
- 「會員」為已註冊並繳交2012年費之醫師，其餘皆適用 「非會員」價（未註冊者請至 http://iaoi.pro 註冊）。
- 報名本活動後，恕不退費！

報名窗口

昇基事業 (02)2788-1335 #206 潘小姐
湧傑企業 (02)2778-8315 #120
iAOI國際矯正植牙學會 (03)5711-377

iAOI第一階段Board Eligible資格考

- 時間：12/09（日）08:00 ~ 09:10
- 地點：台灣金融研訓院 2F(台北市羅斯福路三段62號)
- 報名方式：網路報名，網址為 http://iaoi.pro/
- 報名費用：NT$2,000（原價 NT$10,000）
- iAOI網站上提供題庫免費下載，請醫師提早準備！

考試注意事項：

- 應試者請於 08:20 之前報到完畢。
- **建議使用iPad應試**，無iPad可以筆電代替。
  （試題瀏覽與作答形式，係針對iPad而設計）
- 現場無充電設備，請醫師務必確認考試設備電力充足。

服務專線 (03) 5711-377
網路報名 http:// iaoi.pro/

主辦單位：國際矯正植牙學會　協辦單位：金牛頓藝術科技、湧傑企業、昇基事業

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（Topic 12-22）
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（Topic 23-33）

終身會員

植牙精進包

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33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 I
（Topic 01-11）
-植牙論壇 Implant Forum II
（Topic 12-22）
-植牙論壇 Implant Forum III
（Topic 23-33） New

診所行銷包

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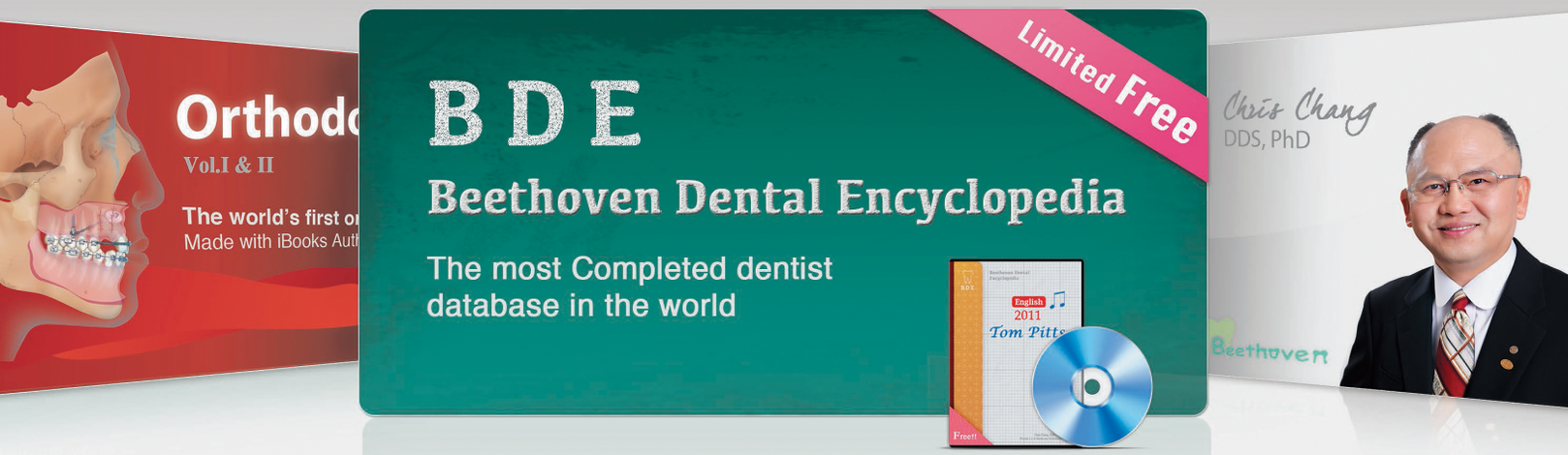

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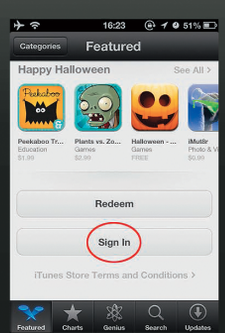
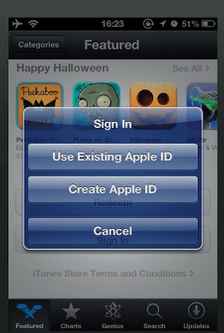
Available on the App Store

Manual – Step by Step

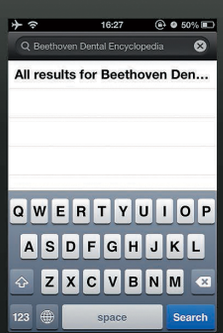
1. Go to App Store on your device.



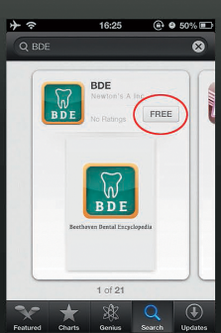
2. "Sign in" with your Apple ID.



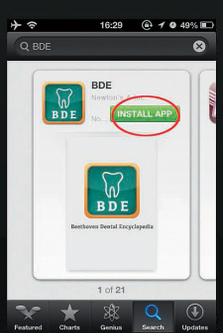
3. "Create Apple ID" if you don't have one.



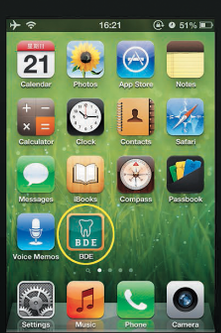
4. Search for "Beethoven Dental Encyclopedia."



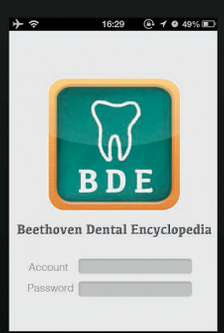
5. Click "FREE."



6. Click "INSTALL APP."



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



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專業簡報	Keynote 簡報法 series 1 簡報聖經	1. 常見簡報謬誤 2. Keynote 入門	*2012/12/27* （四） 09:00 ～ 17:00	科技人、醫師 教師、學生
專業簡報	Keynote 簡報法 series 2 Kokich 的 10 大演講秘訣	1. 多媒體影像處理 2. 簡報設計	*2013/1/17* （四） 09:00 ～ 17:00	科技人、醫師 教師、學生
專業簡報	Keynote 簡報法 series 3 How to Wow'em like Steve Jobs?	1. 賈伯斯演講秘訣 2. 簡報設計進階應用	*2013/3/14* （四） 09:00 ～ 17:00	科技人、醫師 教師、學生
International	Damon and OBS workshop	1. Damon System 2. OrthoBoneScrew	*2013/6/18-20* *2013/11/19-21*	International Orthodontist

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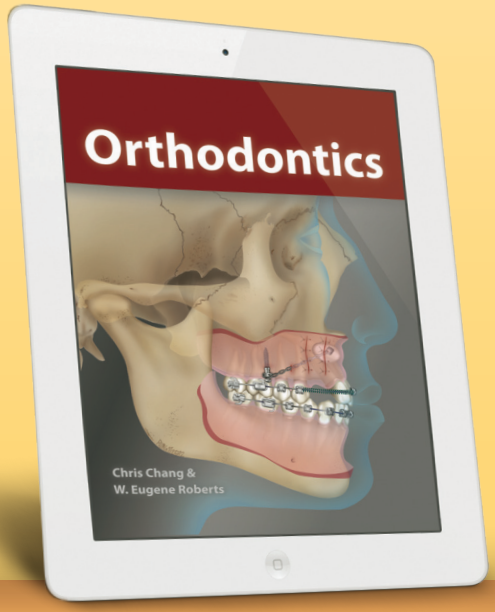

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Dr. Chris Chang gave a whole day lecture at Buenos Aires, Argentine, October 25, 2012.

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