The Most Effective and Simplest Ways of Treating Severe Class III, without Extraction or Surgery

Dr. John Jin-Jong Lin

Mutilated Class II Division 2 Malocclusion: Implant-Orthodontic Treatment Utilizing Flapless Implant Surgery and Platelet-Rich Fibrin

Drs. Sheau-Ling Lin, Chris Chang & W. Eugene Roberts

Compensated, Asymmetric Class II Malocclusion with Horizontal Impaction of Mandibular Second Molars

Drs. Ming Chen Lee, Chris Chang & W. Eugene Roberts

Beethoven Orthodontic Center's Effective Bonding Procedure

Drs. Hsin Yin Yeh & Chris Chang

IJOI

International Journal of Orthodontics & Implantology

Vol. 33 Jan. 1, 2014

The 2013 Beethoven International Damon, OBS and VISTA Workshops participants, together with Dr. John Lin (center left) and Dr. Chris Chang (center right), in front of Dr. Chang's orthodontic literature collection.

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

《僅供牙科專業人士參閱》

2013~2014 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。

	台北 (二)	高雄 2014 (四)	台中 2014 (二)	LECTURE	LAB
1	10/15	5/8	5/6	理想入門病例+Damon Q黏著	Bonding (Damon Q) + BT
2	10/22	5/15	5/27	快速矯正療程四部曲	Ceph + Photo
3	10/29	5/29	6/3	簡捷有效的錨定系統	Damon + OrthoBoneScrew I
4	11/26	6/5	6/24	不拔牙與拔牙分析	Damon + OrthoBoneScrew II
5	12/3	6/12	7/15	Damon 診斷流程及微調	Finish Bending
6	12/24	6/26	7/29	完工檢測及報告示範	Fixed Retainer (FR)
7	2/11/14'	7/17	8/5	維持及復發；病例示範	Presentation Demo
8	2/18	7/31	8/12	矯正力學及診斷分析 (1)	DDX + Case Reports I
9	2/25	8/7	9/2	軟硬組織及診斷分析 (2)	DDX + Case Reports II
10	3/4	8/21	9/9	兒童矯正及診斷分析 (3)	DDX + Case Reports III
11	3/18	9/4	10/7	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。

2014 新竹(三) 9/10 (含午、晚餐)

International workshop

Keynote & managment
OrthoBoneScrew & Damon

2014
中文班 3/10 -13
西班牙語班 5/20 -24
英文A班 6/17 -20
英文B班 12/1 -4

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)	Paper Reviews	Topics & Case Demo
1	7/11	Bracket Placement	Crowding: Ext. vs. Non-ext.
2	8/1	Impacted Canines	Upper Impacted Teeth
3	8/29	Canine Substitution	Lower Impacted Teeth
4	9/12	Missing 2nd Premolar	Missing: Ant. vs. Post.
5	12/5	DI Workshop	Crossbite: Ant. vs. Post.
6	12/12	CRE Workshop	Open Bite High Angle
7	1/9/14'	Excellence in Finishing (occlusion)	Deep Bite Low Angle
8	2/27	Excellence in Finishing (esthetics & perio)	Gummy Smile & Canting
9	3/13	Ortho-Perio-Restore Connection	Esthetic Finishing (Transposition)
10	4/10	Adjunct to Perio	Implant-Ortho
11	4/24	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) 2014 10/3、24 (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V
2013/6/11 7/9 8/20 9/10 10/8 11/5 12/17
2014/1/7 3/11 4/15 5/13

課 程 資 訊

上課地點

【台北】
恒逸資訊中心 畢卡索廳
/ 台北市復興北路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

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＊每次上課請依最新一期 IJOI 公告為主

Keep sharing!

Since 2008, more than 300 doctors from over 20 countries have travelled to this little island to visit Beethoven. We said goodbye to our 16th group at the end of November. I have been deeply touched and humbled by their openness to learn and their willingness to take on new challenges, especially as each one of them is already a mature colleague in our profession.

It all began, after having welcomed numerous doctors, with an idea that we should set up an organized tour for them to understand our system through lectures and to see our practice through chair-side observation, in order for them to properly share our work with the world. I believe sharing is the best motivation for making continuous and tangible improvement.

We started by just teaching the Damon System and OBS miniscrew hands-on workshop. Since then, by popular demand, we have added one-day Keynote workshops to help doctors create simple but effective presentations for patients. In 2012, my good friend and Keynote teacher, Dr. Rungsi, decided to join us and teach participants how to make his beautiful dental drawings come to life in a three-day advanced Keynote Illustration and Animation workshop. In November this year, with the generous help of an army of teaching assistants (*orthodontists*) overcoming numerous logistical challenges, I was able to lead a hands-on VISTA workshop, sharing the best and simplest minimally invasive surgical technique for impaction treatment.

Looking back, none of these were pre-planned with a clear roadmap. We have just simply continued doing what we love - learning and sharing. This year, in addition to the regular two English-speaking workshops, we will hold one in Spanish and one in Mandarin Chinese. We hope these customized courses will ensure all of the visiting doctors get the most out of their Taiwan experience. I look forward to welcoming you all in Beethoven.

Happy holidays, my friends!

Chris Chang DDS, PhD, Publisher

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Dr. Ming Guey Tseng, *Consultant*
Dr. John Lin, *Consultant*
Dr. Frank Chang, *Consultant*
Dr. Johnny Liaw, *Consultant*
Dr. Chris Chang, *Publisher*

The Most Effective and Simplest Ways of Treating Severe Class III, without Extraction or Surgery

A. Differential Diagnosis (Fig. 1)

Using traditional edgewise brackets to treat a severe Class III or Class III open bite (*Fig. 2*), either extraction or surgical treatment would be considered.

Nowadays however, with the advancement of new technologies like Damon system (*Passive Self-Ligating System*) and TADs (*Temporary Anchorage Devices*), this is not the case. If after the 3-ring diagnosis[1] (*Fig. 1*) and the patient has an orthognathic profile, most of the severe Class III cases (*with the exception of 3rd molar extraction*) can be treated without requiring either extraction or surgery.

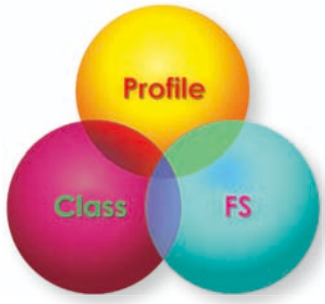


Fig. 1: The 3-ring diagnosis system

B. Treatment Options

Basically, the author uses the following ways to treat severe Class III malocclusion without extraction or surgery.

(*1*) Damon system only

If the patient has no or little crowding, good upper incisor angulation and a good nasolabial angle, a standard torque bracket can be placed upside down on the upper incisors to achieve a super low torque, in order to prevent the upper incisors from flaring labially, while using Class III elastics to retract the whole lower dentition.

Since there is much less friction between the main archwire and the Damon brackets, the Damon system has the amazing MEAW effect[2, 3] (*Fig. 2*), which, without complicated wire bending, and just using Class III elastics is sufficient to correct severe / difficult Class III.

Fig. 2:
With Damon and TADs a severe Class III can be treated orthodontically without extraction and without surgery, as long as patient has orthognathic profile.

(*2*) Buccal shelf screw

For more severe Class III and open bite patients, whose upper incisors are a little proclined, in which case Class III elastics cannot be used too much, then buccal shelf screws[3] (*Fig. 3*) will be used.

In a lot of situations, when the slope of the buccal shelf is very steep, it will be difficult to position the screw

Dr. John Jin-Jong Lin
MS, Marquette University
Chief Consultant of IJOI
President of TAO (2000~2002)
Author of *Creative Orthodontics*

Fig. 3:
Placement of the buccal shelf screws extraradicularly, note the screws are on the buccal side of molar roots not between the roots.

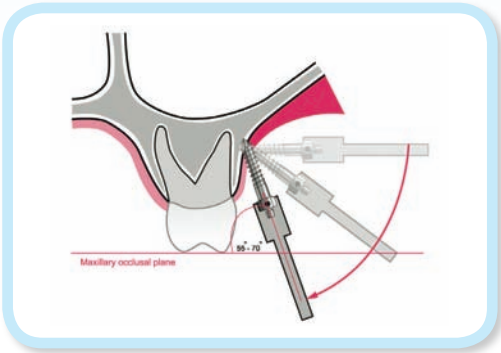


Fig. 4: Original IZC screw placement by Dr. Eric Liu.

really outside the molar roots (*extra-radicularly*) when placing directly with self-drilling. It means, therefore, the screw will be placed between the molar roots (*inter-radicularly*). When this happens, due to the limited space between the lower molar roots, after retracting the whole lower dentition for a while, the distal root of the lower 1st molar will move distally and will come in to contact with the screw, stopping the retraction of the whole lower arch.

Whenever the slope of buccal shelf is steep, the author highly recommends placing the screw through an apically positioned flap.[3] Pilot drilling enables the screw to be really placed extra-radicularly, then retraction of the whole lower arch will be possible and easy.

(3) IZC screw (*Infrazygomatic Crest screw*)

The original study of the IZC screw by Liu[4] (*Fig. 4*) placed the screw over the buccal side of the upper 1st molar's mesiobuccal root, which the author calls The Original IZC Screw. Since the volume of buccal bone outside the upper 1st molar's mesiobuccal root is much less than the volume of the buccal bone outside of the upper 2nd molar, the author prefers to place the IZC screw over the buccal side between the distal portion of the upper 1st molar and the mesial portion of the upper 2nd molar, and calls this technique The Modified IZC Screw [5] (*Fig. 5*).

Fig. 5: Modified IZC screw placement by Dr. John Lin

For upper anchorage or minor upper arch retraction, the original IZC screw is fine. For major whole upper arch retraction, the amount of retraction while using the original IZC screw will quite often be limited, due to the root hitting the screw after a certain amount of upper arch retraction. So, for a greater amount of upper arch retraction, like a big Class II non-extraction treatment, the author prefers the modified IZC placement over the buccal side between the distal portion of upper 1st molar and the mesial portion of the upper 2nd molar (*Fig. 6*).

	IZC screw	Modified IZC screw
Original report	Eric Liou	John Lin
Buccal bone volume	Less	More
Position	buccal side of upper 2nd premolar and 1st molar	Buccal side between distal portion of upper 1st molar and mesial portion of 2nd molar
Chance of hitting the root	More	Less
Amount of whole upper arch retraction	Less	More
Maximal anchorage	Yes	Yes

** For larger amounts of upper arch retraction, without extraction treatment like in a big Class II malocclusion, the use of modified IZC screws is better.*

Fig. 6: Comparison of IZC screw placements

The author has used the buccal shelf screw for whole lower arch retraction (*this technique was learned from Dr. Johnny Liaw's amazing case*) for more than 7 years and has got used to using it on the treatment of severe Class III. On July 3rd 2011, the author attended Dr. Jae Hyun Sung's "*Orthodontics Is Getting Smarter*" Course in which, Dr. Sung showed many impressive Class III cases treated with IZC screws and Class III elastics, the results were great. Since then the author has used more and more IZC screws and Class III elastics to treat difficult Class III cases, with very encouraging results.

Originally the author thought, Class III elastics from the IZC screw would not be as efficient as retraction of the whole lower arch using buccal shelf screws. Actually it's quite effective. Nowadays, only on a really severe Class III, will the author use the buccal shelf screws for retraction. In a lot of Class III malocclusions, there is also upper arch crowding or proclined upper incisors due to the dental compensation, therefore the IZC screw is very helpful in retracting the upper dentition distally and solving the crowding and problem of upper incisor proclination.

Technically, IZC screws are much easier to place than buccal shelf screws, because in a lot of situations, for a good extra-radicular buccal shelf placement, flap surgery is required, which is a much more sensitive technique. The author always refers to a periodontist to carry out the apically positioned flap for placing buccal shelf screws when the slope of the buccal shelf is very steep (*Fig. 7*).

	IZC	Buccal shelf
Upper dentition retraction	Yes	Less
Lower dentition retraction	Yes	Yes, more
For extra-radicular placement	Easy	More difficult
Flap surgery	No	Sometimes needed

** For larger amounts of whole arch retraction the buccal shelf screw is more effective*

** For reducing upper incisor proclination or upper arch crowding alignment, IZC is more effective*

** For severe Class III Tx, a combination of IZC and buccal shelf screws may be needed.*

Fig. 7: Comparison of TADs for difficult Class III Tx

Case Discussion

Case 1

A severe Class III with upright upper incisor and well aligned dentition. Chin point deviated to the right side, an orthognathic profile, and good nasolabial angle.

Diagnosis

A severe Class III asymmetry case with orthognathic profile, left side severe Class III, right side moderate Class III, lower dental midline and chin point deviated to the right side. Upper and lower dentition well aligned, good nasolabial angle and lip position.

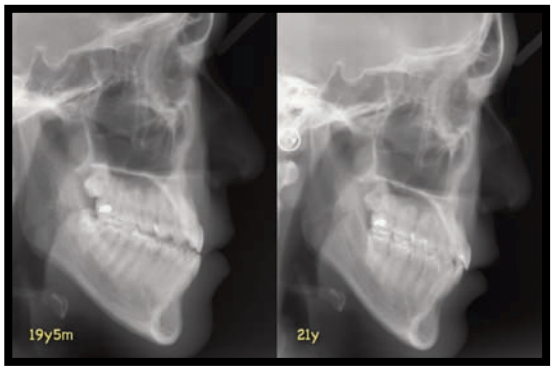
Treatment Plan

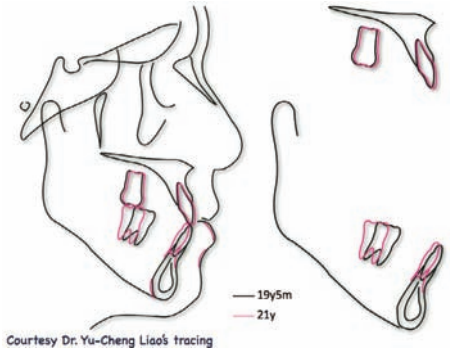
The upper incisors were quite upright, so there was no need to retract. Only Damon system and Class III elastics were used in this case. Special torque selection on anterior teeth maintained a good incisor position while using a lot of Class III elastics.

Treatment Result

This severe Class III was treated purely with the Damon system's MEAW effect and variable torque options of Damon Q.

Standard Damon Q brackets were placed upside down over the upper anterior teeth to make the upper anterior bracket super low torque. Low torque brackets were placed upside down to make the lower anterior bracket high torque.





The cephalometric tracing shows the upper incisors remained upright. Lower dentition was tipped back a lot by the use of Class III elastics. The occlusal plane counterclockwise rotated and the Class III malocclusion was corrected

Post Damon system treatment, the Class III asymmetry malocclusion was corrected to Class I and midline on without premolar extraction. The original good nasolabial angle and orthognathic profile have both been maintained.

Case 2

A severe Class III malocclusion, with functional shift. On the CR profile is orthognathic. Relative procline upper incisor before treatment.

Diagnosis

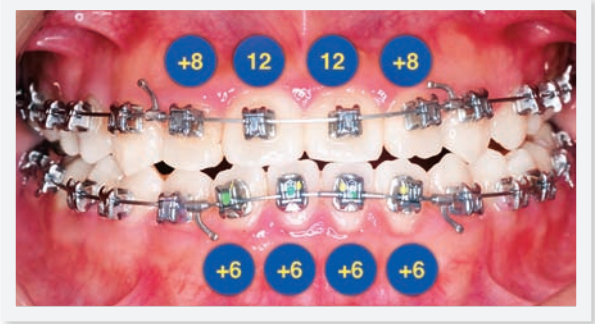
A severe Class III malocclusion with a functional shift. The upper incisor was already a little labially proclined. Upper lip was in a quite normal position, and the patient had an orthognathic profile in the CR position.

Treatment Plan

Used the Damon system's MEAW effect and Class III elastics only.

Treatment Result

The standard Damon 3MX brackets on the upper incisors were not enough to counter the labial protrusion effect of Class III elastics. Even though there was enough distal tip back of the lower molars and Class III was treated to Class I.

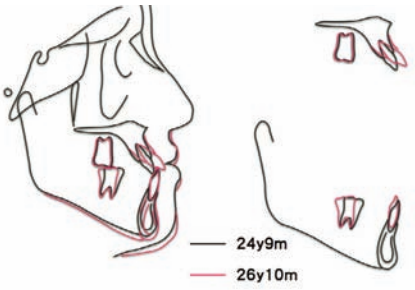


Standard Damon 3MX brackets were used on the upper anteriors. And low torque D3MX brackets were placed upside down on the lower anteriors to get a high torque effect, (*compared to upside down lower anterior Damon Q (+11)*, it's a lesser high torque effect (*+6*).

The upper incisors were flared labially due to the long term use of Class III elastics. Fortunately, the lateral profile was about the same as CR profile before the treatment. There was a good nasolabial angle, and the patient accepted the proclined upper incisor without any complaints at all.

If This Case Were To Be Retreated

The upper incisor bracket would be placed upside down to achieve a super low torque effect to counter the upper incisor protrusion effect of Class III elastics, or also would be combined with an upper IZC screw to prevent flaring of the upper incisors.



Post treatment profile remained orthognathic and good Class I occlusion. The cephalometric super imposition shows severe flaring of upper incisors occurred due to using Class III elastics.

Case 3

Mild crowding in the upper dentition with proclined upper incisors. Class III open bite malocclusion, severely protruded lower lip.

Diagnosis

A Class III open bite case, with orthognathic profile, but lower lip protrusion and upper incisor proclination and an acute nasolabial angle.

Treatment Plan

a) Damon system only: the alignment of the mild crowding would further procline the upper incisor labially.

b) Buccal shelf bone screw retraction: the use of buccal shelf bone screw to retract the upper incisors was deemed not as effective as the upper infrazygomatic crest (*IZC*) screw to retract the upper dentition.

c) The final decision was to use IZC bone screws, not only to retract the upper anteriors but also to retract the whole lower dentition.

Treatment Result

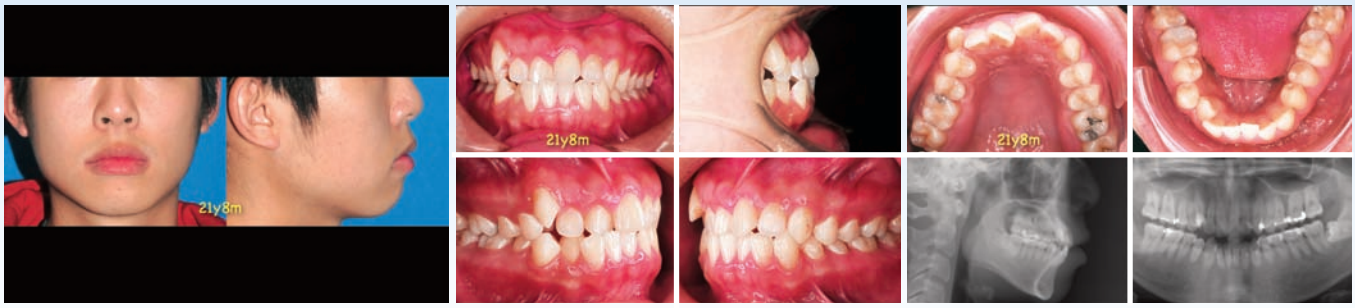
The use of the IZC screw, has successfully retracted the upper incisors and made them more upright. Also the lower dentition has been retracted by using Class III elastics from the IZC bone screw. The acute nasolabial angle has been reduced a little, the protruded lower anterior dentition has been retracted, and the open bite corrected to about a 2mm overbite.

Standard upper incisor brackets were placed upside down creating a super low torque to upright the incisors.

After the two lower 3rd molars were removed, all the braces were bonded and IZC screws placed, not only retracting the upper anteriors but also correcting the Class III malocclusion using Class III elastics.

After 6 months of treatment, the anterior crossbite and open bite had already been corrected, and with enough overbite overjet, Class I molar and canine were also achieved. The protruded lower lip retracted to a much better position. The IZC bone screw retraction of both upper and lower dentition and correction of the upper dental midline would both continue.

Case 4



A Pseudo Class III male, with severe upper and lower crowding. The original nasolabial angle was acute, the treatment avoided flaring of upper incisors and the same acceptable profile was maintained after treatment.

Diagnosis

According to the 3-ring diagnosis, this was a Pseudo Class III male, with crowding in both arches and Class I canine and molar occlusion.

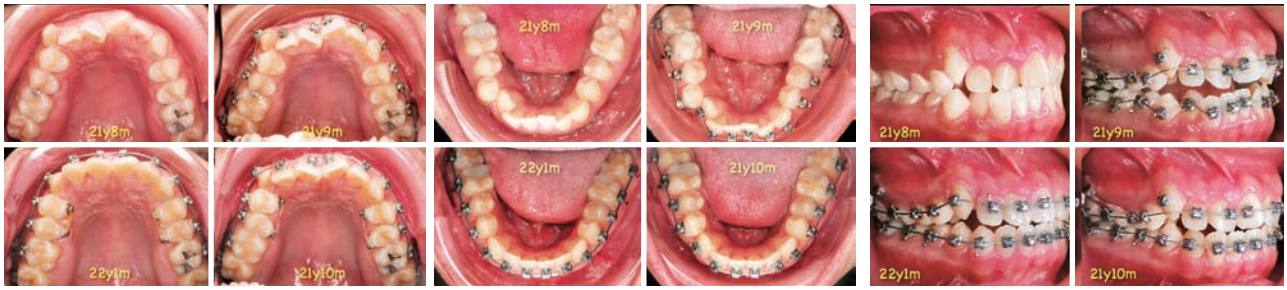
Treatment Plan

To prevent his original full lip profile becoming a bimaxillary protrusion after relief of the crowding, the upper modified IZC screws were placed to retract the upper and lower dentitions during alignment. Also the IZC Class III elastics were used to relieve the lower crowding and treat the anterior crossbite.

Treatment Result

After about 4 months of treatment, both upper and lower arches had been aligned, and there was no further protrusion of the lips.

Two modified IZC screws were placed over the buccal side between distal portion of upper 1st molar and mesial portion of upper 2nd molar.



At the beginning of treatment, the power chain from the IZC screw started to retract the upper dentition, and Class III elastics from the screw retracted the lower dentition.

Since both upper and lower arches had been retracted from the modified IZC screw at the beginning of the treatment, it took only 4 months to align both upper and lower arch crowding, without forward flaring of upper and lower incisors, though the lips seem a little fuller than before treatment. After debonding (*without brackets*), the lips would be about the same as before treatment. And the IZC bone screw can continue to retract both upper and lower arches further, improving the lateral profile even more.

Case 5

A severe Class III patient with mild prognathic profile and severely protruded lower lip. The right upper canine was completely impacted. Lower dentition was quite crowded, meaning after alignment, Class III would worsen.

Diagnosis

A patient with severe Class III malocclusion, a moderate prognathic profile and severe lower lip protrusion. He had rejected orthognathic surgery, so a compromised treatment was planned.

Treatment Plan

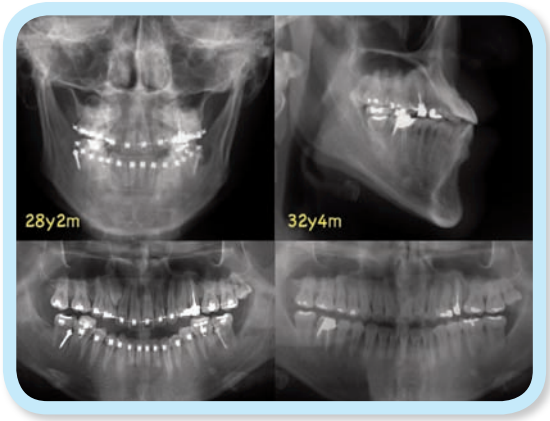
Removal of two lower 3rd molars. Two buccal shelf bone screws to retract the whole lower dentition.

Treatment Result

Just regular Damon D3MX brackets were placed on the upper anteriors. The lower dentition was successfully retracted with the buccal shelf bone screw. The Class III malocclusion was corrected to Class I. However, the upper incisors flared out labially due to opening the space for the impacted right upper canine.

If This Case Were To Be Retreated

The author will place the standard Damon Q brackets upside down to increase the low torque to make the upper incisors more upright. Also from the beginning of treatment the IZC screws will be placed, to retract the upper incisors while opening the space for upper right canine to prevent upper incisor proclination.



On the left 28y 2m postero-anterior cephalogram, showing the buccal shelf bone screws were outside the roots of lower 1st molars, making retraction of the whole lower dentition possible. On the right, post treatment, no more anterior crossbite, but upper incisors were flared forward. Note the buccal shelf screws were outside the roots of lower 1st and 2nd molars, making retraction of Class III malocclusion to Class I, possible. Throughout the whole treatment, only one buccal shelf screw on each side was used.

Waiting for the right upper impacted canine to self-erupt after enough space had been created, 5 years later the treatment was completed to Class I occlusion. The upper incisors were flared forward due to space opening for right upper canine. The Class III canine and molar relationship was corrected to Class I canine and molar mostly by the use of only one set of buccal shelf bone screws.

Case 6

A Class III malocclusion patient with severe crowding in both upper and lower arches, and orthognathic profile with acceptable nasolabial angle and lip position (*courtesy Dr. Yi-Hung Shih*).

Diagnosis

A Class III case with severe crowding in both upper and lower arches. Patient had an orthognathic profile and acceptable lip position.

Treatment Plan

Used the Damon system and buccal shelf bone screws to retract the lower dentition and correct the Class III malocclusion.

Treatment Result

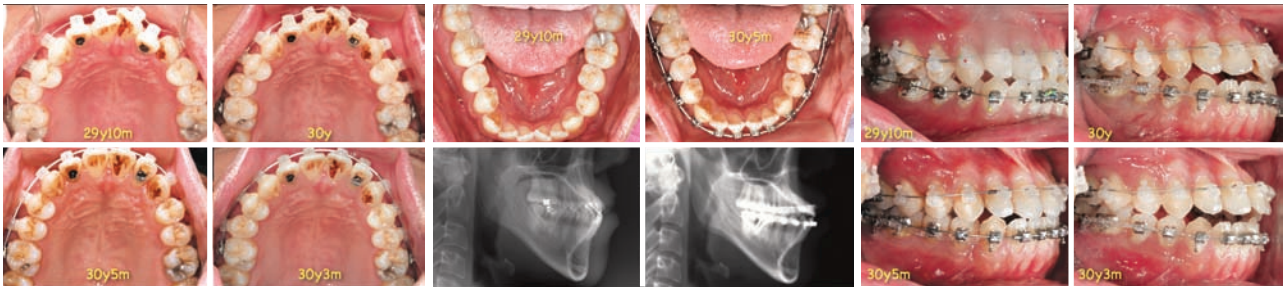
Due to severe crowding on both arches, the early light short Class III elastics only flared the upper incisor more. The original acceptable lip position became protruded. A left side buccal shelf screw successfully retracted the left lower dentition back to Class I, but the right side buccal shelf screw seemed not to work; after 5 months of retraction the lower dentition maintained the same Class III position. From the angulation of the right buccal shelf screw, maybe the buccal shelf screw was placed between the roots and there was contact with the distal root of the lower first molar. Therefore, on the right side there was almost no distal retraction of the lower dentition.

Two buccal shelf screws were placed on the lower arch for retraction of the whole lower dentition. The axis of the right screw seems tilted to the inter-radicular space between right lower first and second molars. The upper arch after alignment, the arch not only expanded transversely but also the upper incisors flared forward.

If This Case Were To Be Retreated

Because of the good nasolabial angle and lip position, the treatment objective would be to try and maintain the original situation. For the severe upper crowding, if an early IZC screw had been used at the beginning of the treatment, the upper incisor could have been aligned without flaring and maintained the original good nasolabial angle.

Also Class III elastics could have been used from the IZC screws to correct the anterior crossbite and Class III malocclusion. In a upper crowding situation, care should be taken when using the early light short Class III elastics, because relief of crowding would have already flared the upper incisors, so, Class III elastics would flare the upper incisor even more, especially on the initial alignment stage.



Despite early light short elastics and two buccal shelf screws were used, it's very difficult to get rid of the Class III on right side occlusion, also the upper incisor flared forward with more acute nasolabial angle.

Buccal shelf screws are very useful for retracting the whole lower dentition, but the placement of the screw is very crucial. The screw should be placed extra-radicularly, otherwise, if (*sometimes due to the steep buccal shelf*) the screw has been placed interradicularly then the contact of the screw on the distal root of the lower first molar will prevent the retraction of the whole lower arch. For an extremely steep buccal shelf situation, flap surgery then placing the screw can be a better choice to prevent placing the buccal shelf screw between the roots.

Case 7

A Class III female patient, with orthognathic profile, but acute nasolabial angle, also moderate crowding in both upper and lower arches, and upper incisor flared labially (*courtesy Dr. Sabrina Huang*).

Diagnosis

A Class III patient with moderate crowding in both arches and an orthognathic profile with acute nasolabial angle and relatively full lips.

Treatment Plan

The original plan was to try and treat with the Damon system and non-extraction. After alignment however, the upper and lower dentition flared forward, the nasolabial angle became acute, therefore for a better axial inclination of the incisors and lateral profile, the upper 2nd premolars and lower 1st premolars were removed.

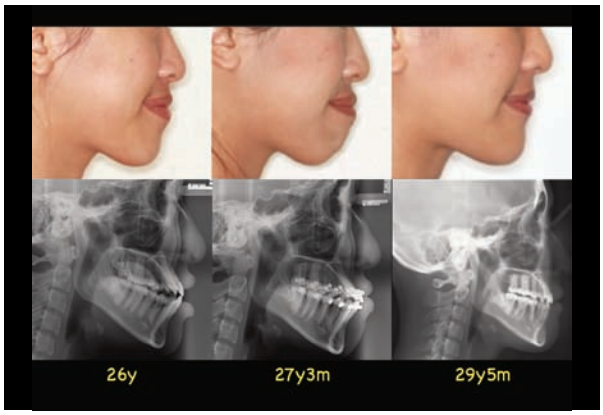
Treatment Result

After alignment of both upper and lower arches, the Class III became a Class I bimaxillary protrusion. After four premolar extractions, the results were good.

After alignment of the dentition and correction of the Class III malocclusion, both upper and lower anterior teeth flared forward more. For better axial inclination of both upper and lower incisors and profile, two upper 2nd premolars and two lower 1st premolars were removed.

If This Case Were To Be Retreated

Due to the flaring upper incisor, full lip profile and also moderate crowding on both arches, it would have made the treatment easier to have started at the beginning of the treatment with four premolar extractions.



During the correction of the Class III, the nasolabial angle became very acute, and bimaxillary protrusion appeared. After extracting four premolars, an excellent profile was achieved.

Conclusion

1) With the proper use of Damon, IZC screws, and buccal shelf screws most difficult Class III can be treated without extraction and without surgery, as long as the patient has an orthognathic profile or is willing to accept a slightly prognathic profile.

2) Upper incisor angulation and nasolabial angle are the key factors for successful Class III treatment. When the upper incisors are already proclined or there is upper arch crowding at the beginning of treatment, placing IZC screws and Damon upper incisor brackets upside down is a very effective way to prevent the upper incisors from flaring and can even make them more upright, making a non-extraction treatment possible.

3) Though early light short Class III elastics are very effective for correction of anterior crossbite, before using them, the upper incisor proclination and upper crowding must be evaluated. Either of the above will cause the upper incisor to procline even more and turn the non-extraction treatment into an extraction treatment.

4) Whenever using the buccal shelf screws to retract the whole lower arch, be sure to place the screw extra-radicularly, if not, the screw contact with the molar root will prevent further retraction of the whole lower arch.

Acknowledgement

Thanks:

(1) Paul Head for his great editing.

(2) Dr. Rungsi for his excellent diagrams making the explanations much clearer.

(3) Dr. Sabrina Hwang and Dr. Yi-Hung Shih for sharing their cases.

(4) Dr. You Cheng Liaw for his accurate cephalometric tracings.

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2014 Beethoven International Damon, OBS & VISTA Workshop

6/17~6/20, 12/1~12/4

LECTURER: Dr. Chris Chang

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

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 andother responsibilities you all have[...].

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

Dear Chris:

[...]I can only say that the Workshop exceeded my expectation and it was truly amazing. Lectures by the world class orthodontists (*Dr. Chris Chang and Dr. John Lin*), and wealth of knowledge from your many years of dedication, wisdom, and clinical experiences were evident through the cases you presented. I am also very much appreciative of the opportunity to observe you actively and effortlessly practicing what you teach through the chair-side observation session held in your very busy practice.

First, as an innovative educator, you encouraged us to be innovative. Second, you taught us your system and showed us tools in Damon and OBS for us to succeed and duplicate it in each of our own practices. Third, you motivated us to continue to continually improve the system. Personally, I am very grateful and thankful for these three pieces of advice you gave to us[...].

John K.S. Tong, DDS, MAGD
Cupertino, California USA

VISTA for Impacted Cuspids In-house Workshop (Pig Jaw)

VISTA for Impacted Cuspids in-office workshop includes one half-day hands-on practice:

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

VISTA:
Vertical **I**ncision **S**ubperiosteal **T**unnel **A**ccess

Damon, OBS & VISTA

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

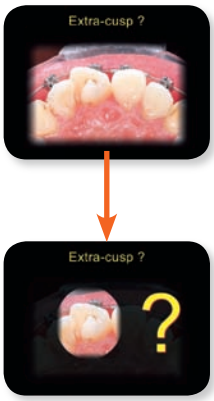
Day 3

09:00—10:00	VISTA for Impacted Cuspids
10:00—10:10	Break
10:10—12:30	Damon + Screw *Dr. John Lin*
12:30—13:30	Lunch
14:00—17:00	VISTA for Impacted Cuspids In-office Workshop (*Pig Jaw*)

Keynote Workshop

Make your presentation great

"I've been a Keynote user and lecturer for 9 years. In June I had the opportunity to attend Newton's A's Introductory Keynote course. To my surprise, I still learn a lot from this supposed to be basic course.



If you think this is a computer course that will show you step-by-step how to use the application, please reconsider. This course is to teach you hands-on, clinical presentation tips. After this course I'm sure that any of you can go back and give a better presentation in your daily dental practice.

If you want to improve communication in your practice, and with patients, this 8-hour course is definitely worth it."

~ Dr. Rungsi Thavarungkul, Thailand
Lecturer, Advanced Keynote Animation and Illustration Workshop

Day 4 - Keynote

09:00—10:00	Introduction of Keynote: Organize your patient files for presentation
10:00—10:10	Break
10:10—11:30	Key Presentation Principles I
11:30—13:30	Lunch
14:00—15:30	Key Presentation Principles II
15:30—15:45	Break
15:45—17:00	Make it Visual

Damon & OBS Workshop

includes two half-day lectures, two half-day chair-side observation sessions, one model practice and one surgical hands-on session.

Registration fees cover local transportation, meals and two nights of shared accommodation (double occupancy). Airport pick up is available upon request with additional charges.

Fees: USD 2,600
Early bird rate: USD 200 off by 04/17,10/01

Keynote Presentation workshop

includes one day of lecture and hands-on practice, focusing on improving your professional digital communication skills. The workshop adopts the Macintosh (Apple) system and its native presentation software, Keynote '09.

Registration fees cover local transportation, meals and one nights of shared accommodation (double occupancy).

Fees: USD 500
Early bird rate: USD 100 off by 04/17,10/01

Registration:

A 50% deposit is required to complete registration.

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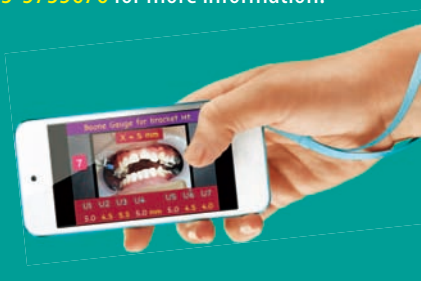

Mutilated Class II Division 2 Malocclusion: Implant-Orthodontic Treatment Utilizing Flapless Implant Surgery and Platelet-Rich Fibrin

SUMMARY

This severe mutilated Class II malocclusion (DI=36) in a adult female was managed with combined orthodontics and implant-supported prostheses. The upper right 1st molar and hopeless lower right 2nd molar were extracted, and the adjacent 2nd or 3rd molars were moved mesially to close the space. The missing left upper 1st molar was restored with a flapless implant procedure, to preserve available bone and soft tissue. Although there was a modest compromise in the buccal interdigitation, this interdisciplinary approach resulted in an excellent, cost effective improvement in occlusal function (CRE+20) and dental esthetics (P&I=3). (Int l Ortho Implantol 2014;33:22-47)

Key word:
Deep bite, atypical extractions, implant-supported prosthesis, flapless implant surgery, platelet-rich fibrin (PRF)

History and Etiology

A 20-year-old female patient was referred by her general dentist for an orthodontic consultation to evaluate the patient's chief concern: unattractive smile (*Figs. 1-3*). This problem was resolved to the patient's satisfaction with implant-orthodontic treatment (*Figs. 4-6*). Despite a broad array of dental problems that will be specified, there was no contributing medical history. Pretreatment photographs showed a relatively straight profile with irregular anterior gingival margins and an inadequate display of dental proportions when smiling. The maxillary and mandibular midlines were shifted to the left, which may be related to three missing teeth: maxillary left 2nd premolar, maxillary left 1st molar, and mandibular left 1st premolar. The intraoral photographs (*Fig. 2*) revealed the residual roots of a hopeless mandibular right 2nd molar, and a maxillary right 1st molar with a poor prognosis due to extensive loss of tooth structure. The panoramic radiograph (*Fig. 7*) revealed a horizontally impacted mandibular left 3rd molar, and three endodontically treated teeth: the maxillary right 1st molar and both upper central incisors. Because of a lack of patient availability, the total dental treatment time was 5 years and 9 months for two phases of fixed appliance treatment, that was followed by an implant-supported crown to restore the left maxillary 1st molar in the site of the adjacent 2nd premolar. There was a one year pause in the orthodontics treatment because the patient was overseas on business. Post-treatment lateral cephalometric and panoramic radiographs illustrate the dental alignment achieved (*Fig. 8*), and superimposed cephalometric tracings (*Fig. 9*) document the dental and facial results.

Dr. Sheau-Ling Lin,
Instructor, Beethoven Orthodontic Course (left)
Chris Chang, DDS, PhD.
Founder, Beethoven Orthodontic Center
Publisher, International Journal of Orthodontics & Implantology (Middle)
W. Eugene Roberts, Consultant,
International Journal of Orthodontics & Implantology (Right)

Fig. 1. Pre-treatment facial photographs

Fig. 4. Post-treatment facial photographs

Fig. 2:

Pre-treatment intraoral photographs reveal a deep overbite situation, upper right 1st molar with poor prognosis , lower right 2nd molar residual roots, and three missing teeth: upper left 2nd premolar, 1st molar, and lower left 1st premolar.

Fig. 5:

Post-treatment intraoral photographs document the final alignment with an implant-supported prosthesis in the upper left posterior quadrant.

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

Fig. 6. Post-treatment study models (casts)

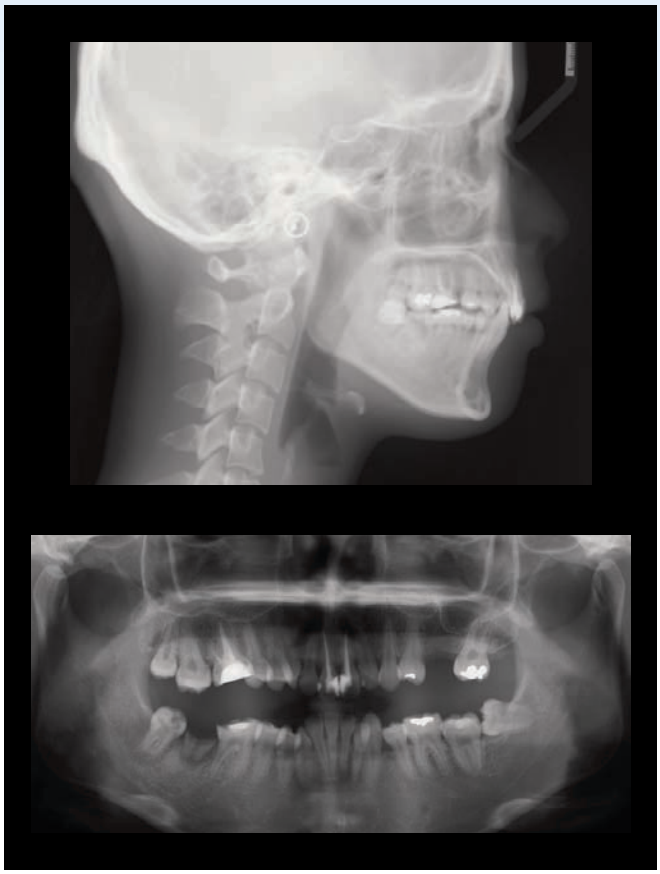

Fig. 7:

Pre-treatment lateral cephalometric and panoramic radiographs show a horizontally impacted lower left 3rd molar, and endodontially treated upper central incisors.

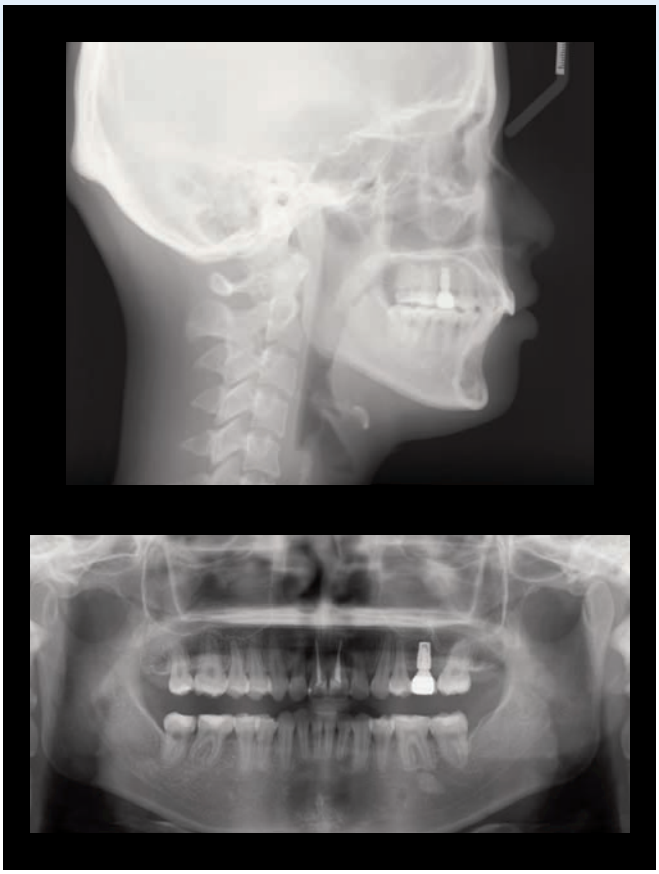

Fig. 8:

Post-treatment lateral cephalometric and panoramic radiographs document the final alignment with an implant supported crown in the upper left posterior quadrant.

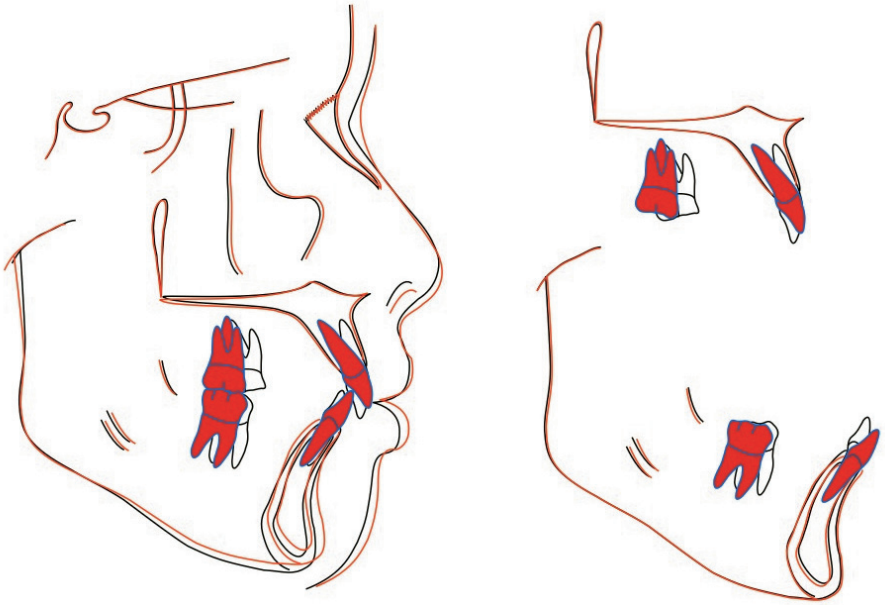

Fig. 9:

Superimposed cephalometric tracings reveal the changes in molar and incisor positions. Note the mandible was rotated slightly counterclockwise decreasing the vertical dimension of occlusion.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	88°	87.5°	0.5°
SNB°	81°	81.5°	0.5°
ANB°	7°	6°	1°
SN-MP°	32°	30°	2°
FMA°	26°	24°	2°
DENTAL ANALYSIS			
U1 TO NA mm	0.5 mm	2 mm	1.5 mm
U1 TO SN°	96°	113°	17°
L1 TO NB mm	5 mm	6 mm	1 mm
L1 TO MP°	89°	100°	11°
FACIAL ANALYSIS			
E-LINE UL	0 mm	-0.5 mm	0.5 mm
E-LINE LL	1.5 mm	1.5 mm	0 mm

■ Table 1: Cephalometric summary

Diagnosis

Skeletal:

1. Skeletal Class II: SNA 88°, SNB 81°, ANB 7°

2. Mandibular plane angle within normal limits (*WNL*): SN-MP 32°, FMA 26°

Dental:

1. Molar relationship: Class II on the right side, missing upper left 1st molar

2. Canine relationship: Class II on the right and Class I on the left

3. The overjet was 3.5 mm and the overjet was 8mm (*100% of lower incisor height*) with palatal impingement

4. Crowding: -16 mm in the upper arch, and -10 mm in the lower arch

5. Residual roots were retained for the hopeless mandibular right 2nd molar

6. Missing teeth: Maxillary left 2nd premolar and 1st molar, and mandibular left 1st premolar

7. Endodontically treated maxillary right 1st molar and 2 maxillary central incisors

8. Horizontally impacted mandibular left 3rd molar

9. Maxillary dental midline was 3 mm left of the facial midline

Facial:

Acceptable profile with slightly protrusive lower lip

The ABO Discrepancy Index (*DI*)[1] was 36 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: Slight protrusion
- Vertical: Decrease
- Transverse: Maintain

Dentition

- Remove all carious teeth and replace unesthetic amalgam restorations

- Extract teeth with hopeless or poor prognosis, and close spaces if possible
- Relieve maxillary and mandibular crowding
- Prepare an adequate site for an implant-supported crown to replace the missing left maxillary 1st molar
- Correct the midline
- Establish normal overjet and overbite
- Achieve an Angle Class I molar and canine relationship bilaterally

Facial Esthetics: Maintain

Treatment Plan

After careful review of the patient's facial profile, dental, and occlusal problems, the treatment plan was as follows:

1. Restore the carious teeth before starting orthodontics treatment
2. Extractions: upper right 1st molar, residual roots of lower right 2nd molar, lower left horizontally impacted 3rd molar
3. Full fixed orthodontic appliance
4. Anterior bite turbos on maxillary central incisors for deep bite correction
5. Protract upper right 2nd and 3rd molars, as well as the lower right 3rd molar to close edentulous spaces
6. Protract upper left 2nd molar and leave appropriate space on the mesial for an implant-supported prothesis
7. Orthodontic bone screw(*s*) to assist in correction of the midline deviation (*if needed*)
8. Establish a Class I pre-prosthetic occlusion with adequate protrusive guidance and canine protected lateral excursions
9. Detailed bending and settling elastics to produce the final occlusion
10. Sinus-lift augmentation may be needed for maxillary left implant placement
11. Once the implant has integrated, restore with a crown
12. Ceramic crowns for endodontically treated upper central incisors
13. Retain the corrected malocclusion using clear overlay retainers for both the maxillary and mandibular arches

Appliances and Treatment Progress

After routine dental care and the prescribed extractions were completed, an 0.022" slot Damon D3MX bracket system (*Ormco*) was bonded on both arches with standard torque brackets on both the maxillary and mandibular anterior teeth (*Fig. 10*). The archwire sequence for the upper arch was .014" CuNiTi, .014"x.025" CuNiTi, .017"x.025" TMA, .019"

Fig.10:

Standard torque brackets were used for all teeth in both arches.

Fig. 11:

After 10 months of initial alignment, composite resin bite turbos (bite opening occlusal stops) were placed on the palatal surfaces of the maxillary central incisors.

x0.25" SS. The lower arch wire sequence was .014" CuNiTi, .014"x.025" CuNiTi, .017"x.025" TMA, .016" x0.25" SS. In the 10th month of treatment, composite resin bite turbos were placed on the palatal surface of the maxillary central incisors (*Fig. 11*) to intrude both maxillary and mandibular incisors. During intrusion, the upper and lower archwires were .014" x.025" CuNiTi, and the patient was instructed to wear Class II elastics (*Parrot 5/16", 2oz*) full time, bilaterally from the maxillary 1st premolars to mandibular 1st molars.

In the 14th month, the maxillary archwire was changed to .019"x0.25" SS, whilst the mandibular archwire was changed to .017"x.025" TMA. Two

Fig. 12:

Power chains were used to close all extraction spaces except in the upper left quadrant where an open coil spring was used to maintain the site for an implant.

crimpable hooks were attached bilaterally to the maxillary archwire between the lateral incisors and canines (*Fig. 12*), and the Class II elastics from the upper arch wire hooks to the lower terminal molars were upgraded (*Fox 1/4", 3.5 oz*). Power chains were used to close the extraction sites for the maxillary right 1st molar and mandibular right 2nd molar extraction sites. After 15 months of treatment (*including 7 months of missed appointments due to the patient's job relocation*), the two extraction spaces were closed. The implant site between the maxillary left 1st premolar and 2nd molar measured 5 mm in the 29th month, so a NiTi open coil spring was utilized to create an additional 3 mm of space for the future implant placement (*Fig. 13*).

Fig. 13:

The anterior bite turbos were removed when the desired overjet and overbite had been achieved. The length of the open coil spring in the maxillary left 2nd premolar area was increased to create a larger space for the implant.

The treatment was paused for 1 year because of the patient's oversea business commitments. In the 42th month of treatment, bracket repositioning was performed as indicated by the panoramic films, and both archwires were decreased in size: .014"x.025" CuNiTi for the upper and .018" CuNiTi for the lower. In the 49th month of treatment, a miniscrew (*2x12 mm, OrthoBoneScrew, Newron's A, Inc.*) was inserted into the maxillary right infrazygomatic crest to correct the midline discrepancy (*Fig. 14*). The upper midline had shifted about 1mm to the left, despite a unilateral right Class II elastic worn for the preceding 7 months.

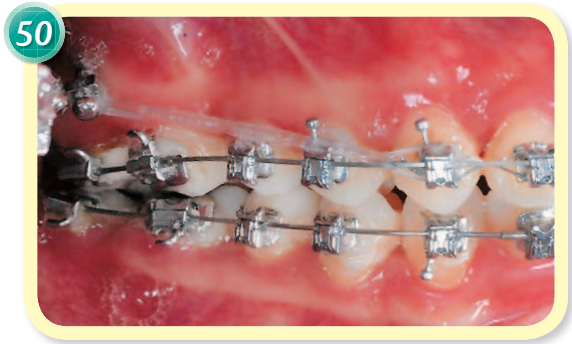

Fig. 14:

A miniscrew was inserted in the upper right infrazygomatic crest (IZC) to achieve midline correction and Class I occlusion.

After 6 months of treatment, the bimaxillary archwires were progressively changed to .017"x.025" TMA, the occlusion had been adequately corrected, and the space for the implant site had been well prepared for placement.

Implant Placement

As the implant was developed, the floor of the maxillary sinus decreased. A pre-operative CT scan was indicated (*Fig. 15*) to plan the implant surgical procedure. The bone height was about 9 mm on the buccal side and 7.5 mm on the palatal side

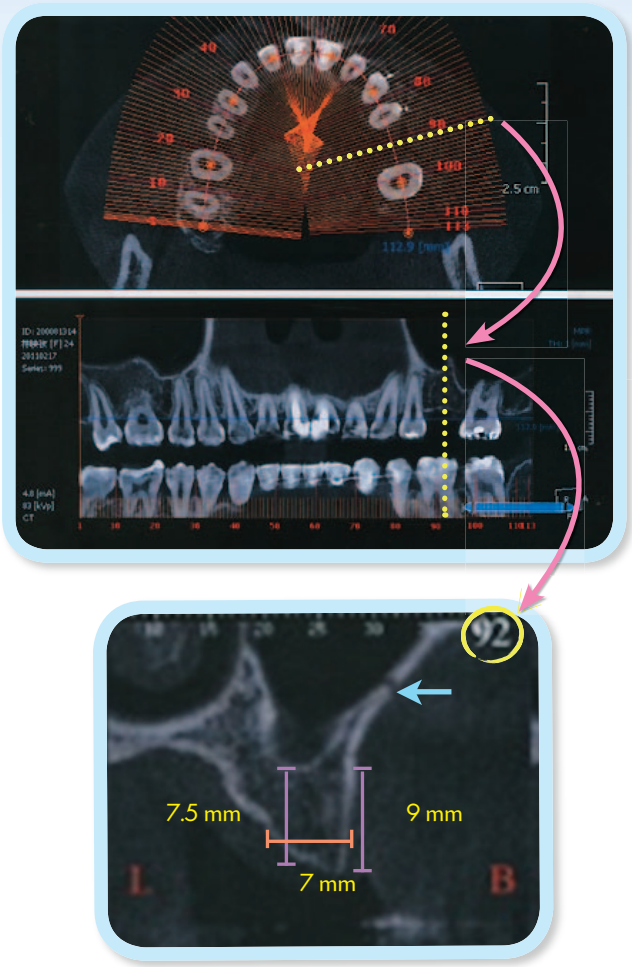

Fig. 15:

Slices view of the CBCT scan showed that the bone height was about 9 mm on the buccal side and 7.5 mm on the palatal side of the implant site. Note the blood vessel tract (blue arrow) demonstrating that this would be a high risk site for sinus augmentation with the lateral window technique.

consistent with the bucco-lingual slope of the alveolar ridge. A flapless implant surgery technique, with an osteotome sinus floor elevation, was indicated for the implant placement, and the patient was so informed before the surgery. A surgical stent was designed following the 2B-3D rule[1] for precise implant placement in all three dimensions.

After injecting the local anesthesia, the surgical stent was fitted into position and a periodontal probe was used to penetrate the soft tissue to make a puncture (*Fig. 16*) for marking the central position of the future implant. A soft tissue

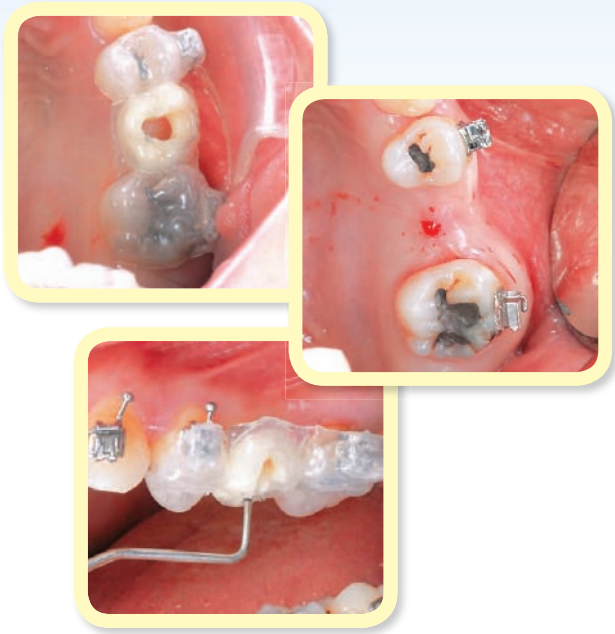

Fig. 16:

The surgical stent was fitted into position and a periodontal probe was used to penetrate the soft tissue to make a gingival puncture for marking the central position of the future implant.

punch (*Ø4.0 mm*) was utilized to make a circular incision through the gingiva. A core of soft tissue was then removed from the crestal bone with a surgical curette (*Fig. 17*). Before the osteotomy, a soft tissue thickness of 3 mm was measured using a periodontal probe (*Fig. 18*).

The surgical stent was repositioned for the initial osteotomy to guide the first lancer drill to 10 mm in depth (*7 mm bone depth and 3 mm soft tissue depth*) (*Fig. 18*). Then a surgical guide pin (*Ø2.0 x 10 mm*) was placed and a periapical X-ray was taken (*Fig. 19*) to check the remaining distance to the sinus floor and the mesiodistal angulation of the implant site preparation. Sufficient bone was available for further drilling to receive an implant fixture Ø4.3 x 8 mm in size. The implant site osteotomy was continued with

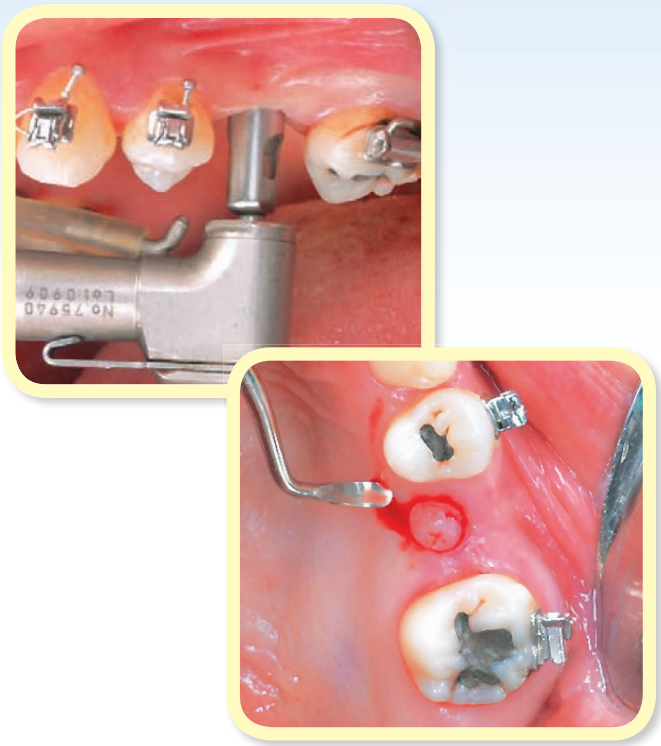

Fig. 17:

A soft tissue punch cut a circular incision through the gingiva. The core of soft tissue was then removed from the crestal bone with a surgical curette.

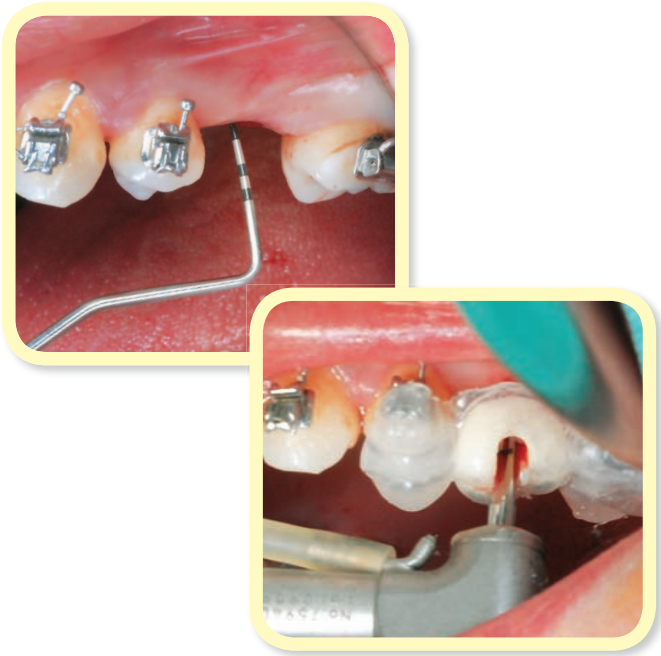

Fig. 18:

The soft tissue thickness was measured to be 3 mm before the implant placement. Then the surgical stent was fitted again to guide the first lancer drill for an initial osteotomy that was 10 mm in depth.

twist drills following the manufacturer's instructions to produce an osteotomy that is 3.9 mm in diameter and 11 mm in length, with 8 mm bone depth and 3 mm of soft tissue thickness (*Fig. 19*). Tactile feedback of bone density was carefully noted during the osteotomy to prevent accidental sinus floor perforation.

Fig. 19:

After the initial osteotomy, a surgical guide pin was placed and a periapical X-ray was taken to check the remaining distance to the sinus floor as well as the mesiodistal angulation of the osteotomy.

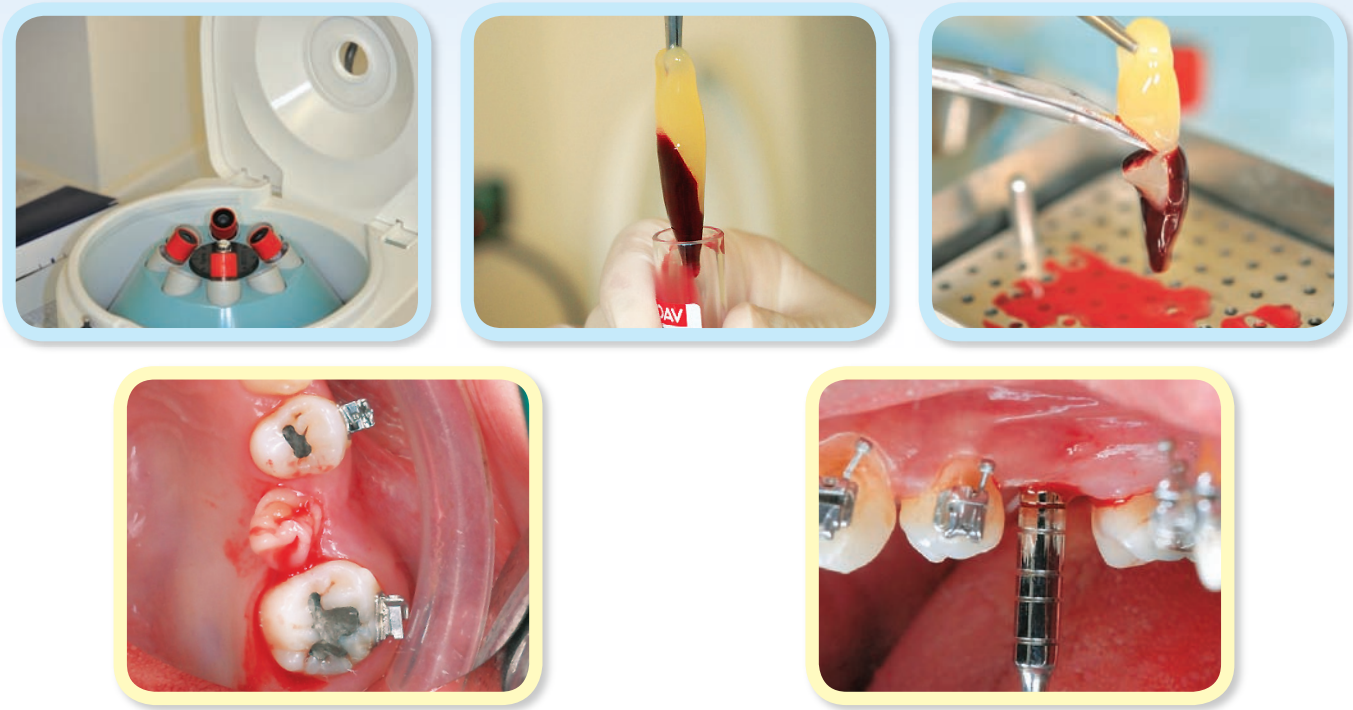

Fig. 20:
The PRF was prepared with a centrifuge and then inserted into the base of the prepared implant site.

During the surgery, about 8 ml of the patient's whole venous blood was drawn into 10 ml glass-coated plastic tubes without anticoagulant and immediately centrifuged (*Process PC O2 centrifuge*) at 3000 rpm for 10 minutes (*Fig. 20*). The specimen settled into 3 layers: upper straw-colored acellular plasma, the red-colored lower fraction containing red blood cells, and the middle fraction containing the fibrin clot, deemed the platelet-rich fibrin (*PRF*) layer. The upper straw-colored layer was removed and the middle fraction containing the PRF was collected gently, with sterilized cotton pliers from 2 mm below the lower dividing line (*Fig. 20*). Before the implant placement, the PRF was inserted into the prepared implant site, and an osteotome (*Fig. 20*) (*Ø3.8 mm, Salvin®*) was used to push it axially into the apical third of the prepared implant site. PRF was used to ensure sinus membrane integrity when

Fig. 21:
The implant fixture was installed, along with a 5 mm healing abutment.

the implant was inserted, as well as to promote the subsequent healing process.

The implant fixture (*Fig. 21*) (*Ø4.3 x 8 mm, A+ system, MegaGen® Taiwan*) was installed, and a 5 mm healing abutment was connected to it. A periapical X-ray was taken to check the position and angulation of the implant, to confirm the integrity of the sinus membrane, and to make sure that the healing abutment had achieved the correct position. The postoperative panoramic radiograph and CT scan were taken 2 and 5 weeks after the surgery respectively (*Fig. 22*).

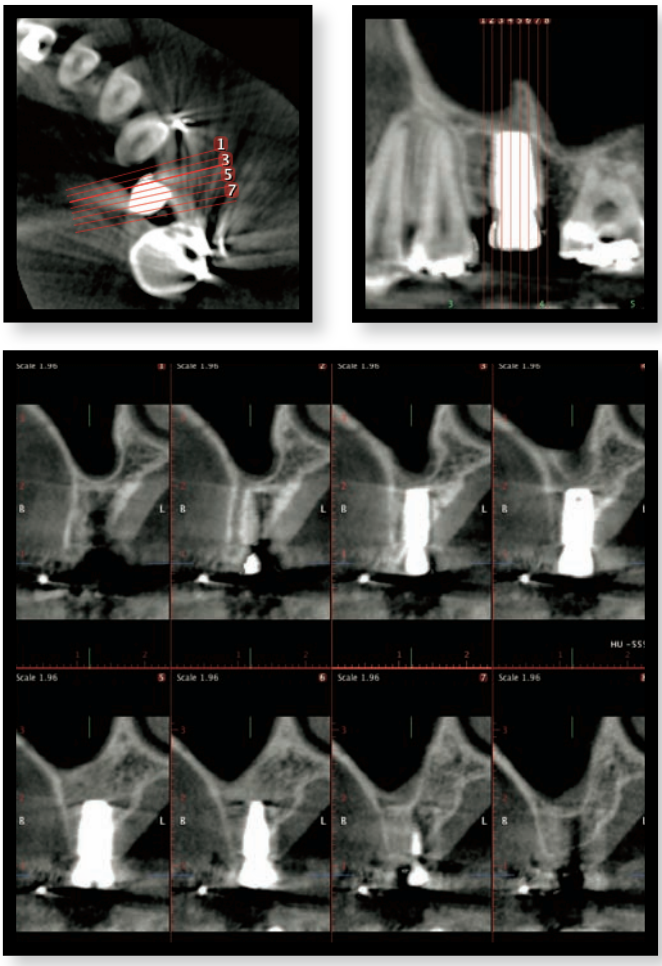

Fig. 22:
Post-operatively, the slice view of the CBCT images (below) showed that the buccal bone thickness was 2 mm which is desirable for the longterm success of the implant-supported prosthesis.

Orthodontic Finishing

Bracket repositioning was performed as indicated by sequential panoramic films during several appointments. The right side Class II elastics and power chains hung on the miniscrew were used to Bracket repositioning was performed as indicated by sequential panoramic films during several appointments. The right side Class II elastics and power chains anchored by the miniscrew to improve the occlusal relationship. Chipmunk 1/8", 3.5 oz elastics (*Ormco*) were applied from a drop hook attached to the maxillary left 1st premolar bracket to a button on the lingual surface of the mandibular left 2nd premolar, to correct the occlusal contacts and buccolingual inclination.

In the 64th month of treatment, reshaping the contour of the maxillary central incisors, and the mandibular, central and lateral incisors was performed (*Fig. 23*) for two reasons: 1. control the anterior teeth from flaring, and 2. change the triangular shaped central incisors to a more pleasant rectangular contour, and to eliminate the dark triangles of interdental areas.

After 67 months of treatment, all appliances were removed. Upper and lower clear overlay retainers were delivered for both arches, and the patient was scheduled for the implant prosthesis fabrication.

Fig. 23:

The anterior teeth are shown before (left) and after (right) reshaping.

Implant Prosthesis Fabrication

Three weeks after removal of the orthodontic appliances, 10 months after the implant was placed, the healing abutment was removed and the surrounding tissue thickness was measured to be 3 mm thick (*Fig. 24*). A 2.0 mm cuff height multi-post abutment (*Ø5.0 mm, 5.2 mm post height and 2.0 mm cuff height*) was selected for prosthesis fabrication. The post height of the abutment was then adjusted extraorally with a diamond bur mounted on a high speed hand piece, to provide 1.5 mm inter-occlusal clearance for the fabrication of a zirconia crown (*Fig. 25*). The abutment level impression technique was chosen. Before taking an impression, the abutment screw was torqued to 35-N-cm (*Fig. 25*) with a screw driver and a torque ratchet. Double core packing[2] (*Figs. 26A and 26B*) began with a thinner (*KnitTrax™, #00*) gingival retraction cord for soft tissue compression, and proceeded with a thicker cord (*KnitTrax™, #1*) for soft tissue reflection using a cord packing instrument. The screw access hole for the abutment

Fig. 24:

After removing the healing abutment, the surrounding soft tissue thickness was found to be 3 mm thick. This is an important measurement for selecting the correct prosthetic abutment.

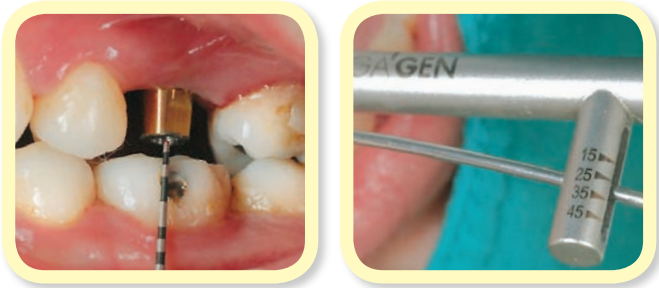

Fig. 25:

The abutment was adjusted to provide 1.5 mm of inter-occlusal clearance (left) for the future zirconia all ceramic crown, and it was then torqued to 35 N-cm (right).

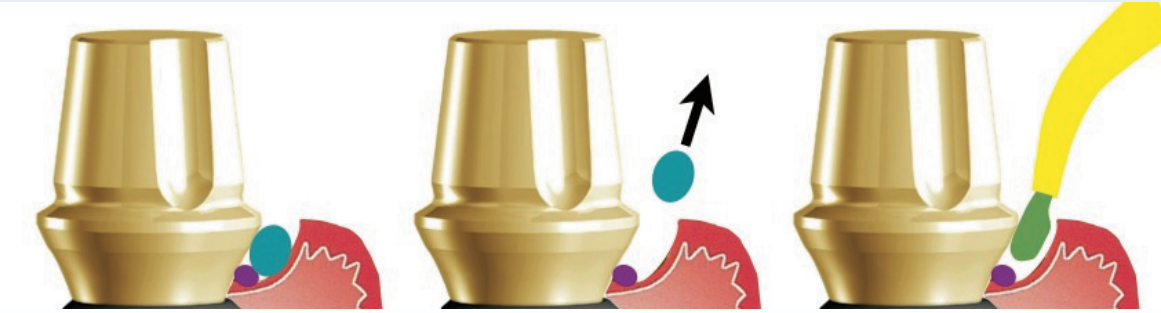

Fig. 26A:

Schematic drawings illustrate the double core packing method (left). The impression was carried out with only the first compression cord (purple) left in the base of the gingival sulcus (middle drawing). In the right illustration, the large diameter gingival retraction cord (Blue-green) was removed (black arrow), and the impression material (green) was injected into the sulcus with a syringe (yellow).

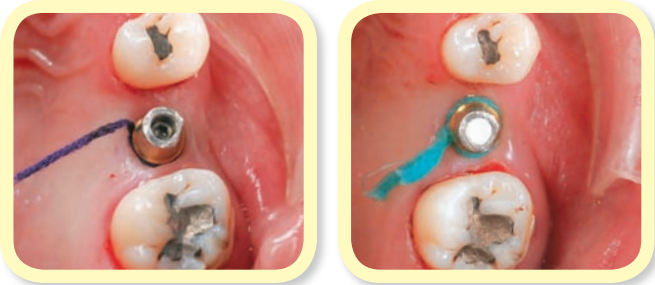

Fig. 26B:

Clinical photographs show the double core packing method: a thinner gingival retraction cord is inserted first for soft tissue compression deep in the sulcus (left), and a thicker cord (right) is packed into the sulcus for soft tissue reflection.

Fig. 27:

A direct impression was carried out with polyvinyl siloxane impression material (Left) and poured in type IV dental stone for prosthesis fabrication.

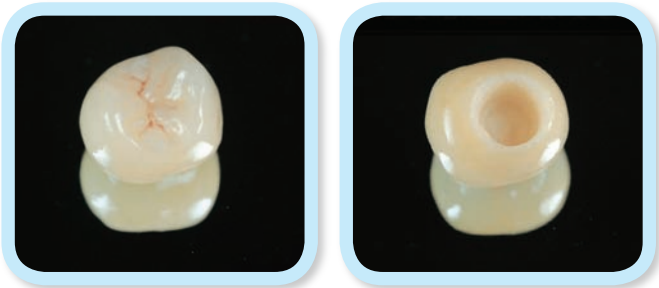

Fig. 28: Zirconia all ceramic crown

was then sealed with a small cotton pleget and temporary cement (*Caviton, GC*). A direct impression was made with polyvinyl siloxane impression material leaving only the first compression cord in the gingival sulcus (*Fig. 27*).

The impression was poured in type IV dental stone, and the casts were subsequently mounted on an articulator using an appropriate check-bite record. A zirconia all ceramic crown was fabricated by a commercial laboratory (*Figs. 27 and 28*). After completion of the final prosthesis, the marginal integrity was verified with a dental explorer and appropriate tightness of the contact area was confirmed with dental floss. After clinical adjustment and verification of fit and occlusion, the permanent crown was luted into place with temporary cement (*Fig. 29*).

After delivery of the implant prosthesis, all old amalgam restorations were replaced with more esthetic composite resins (*Fig. 30*). Further prosthetic treatment, using all-ceramic crowns on the

endodontically treated maxillary central incisors was proposed, but the patient declined because she was satisfied with the current treatment outcome (*Fig. 31*), and had financial concerns regarding further treatment.

Fig. 29:
The permanent crown was completed and luted into place with temporary cement.

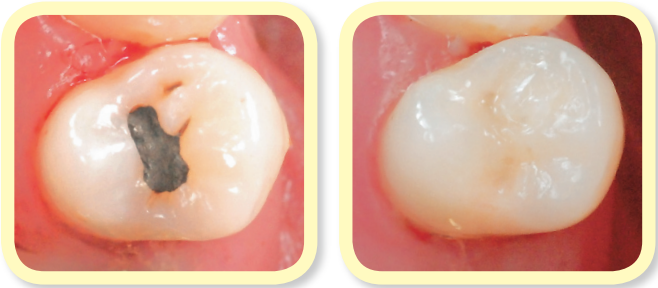

Fig. 30:
After delivery of the implant-supported crown, amalgam restorations were replaced as indicated with more esthetic composite resin.

Fig. 31:
A post-treatment 45° facial photograph shows the facial and dental esthetics achieved.

Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: Maintained
- Vertical: Decreased by rotating the mandible counterclockwise 2°
- Transverse: Maintained

Maxillary Dentition

- A - P: Incisor roots were retracted
- Vertical: Incisors slightly intruded
- Inter-molar / Inter-canine Width: Expanded

Mandibular Dentition

- A - P: Incisors moved anteriorly 1-2mm
- Vertical: Incisors intruded ~3mm
- Inter-molar / Inter-canine Width: Expanded

Facial Esthetics: Maintained (Fig. 9).

Retention

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. Retainer home care and maintenance instructions were provided.

Final Evaluation of Treatment

The ABO Cast-Radiograph Evaluation (*CRE*) score[3] was 20 points. The major discrepancies were occlusal relationships (*Fig. 32*) (*9 points*), and occlusal contacts (*3 points*). The asymmetric extractions and

Fig. 32:

The asymmetric extraction pattern and unfavorable positions of some missing teeth contributed to the compromised interdigitation of the buccal segments.

positions of the missing teeth appeared to be the major factors contributing to the compromised final occlusion. Details of the CRE scores are presented in the The smile esthetics were substantially improved by relieving crowding of the maxillary anterior teeth, establishing a proper gingival margin display, and correcting the dental midline. Occlusal function was improved by providing adequate protrusive guidance and proper bilateral occlusal contacts of the posterior teeth. Overall, there was a significant improvement in dental esthetics and function. The patient was satisfied with the treatment outcome (*Fig. 31*).

Discussion

The deep overbite correction is a prominent issue in orthodontics. Graber has defined "*deep bite*" as a condition of excessive overbite, where the vertical measurement between the maxillary and mandibular incisal margins is excessive when the mandible is brought into habitual or centric occlusion.[4] It is customary to diagnose deep bite when the incisor overlap exceeds one-third of the crown height of the lower incisors. Dawson[5] felt that deep anterior overbite was only a problem if there are no stable holding contacts. For the present

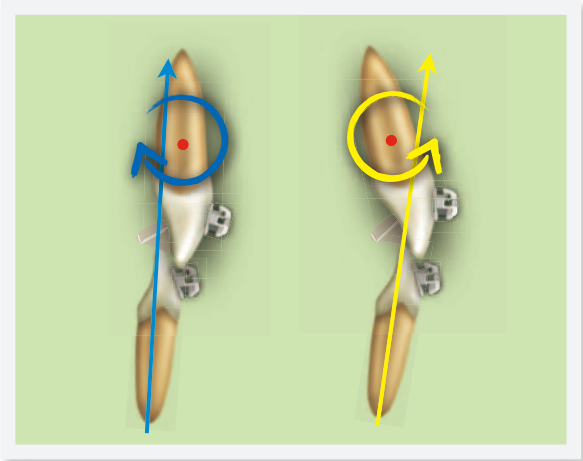

Fig. 33:

It is important to correct the axial inclination of a palatally tipped maxillary central incisor before applying a bite turbo. Otherwise the intrusive force from occlusion of the lower incisors generates an unfavorable moment tending to rotate the upper clockwise (left). Once the upper incisor inclination is corrected, occlusion on the bite turbo produces a favorable moment for further correcting the axial inclination of the maxillary incisor (right).

patient, the mandibular incisors were impinging on the palatal gingiva of the maxillary central incisors, which is evidence for an unstable relationship that may progress if posterior centric stops continue to deteriorate. The endodontically treated maxillary central incisors are at risk unless the unstable intermaxillary relationship is corrected.

There are four treatment options for correcting Class II division 2, deepbite malocclusions: 1. extrude posterior segments, 2. intrude maxillary incisors, 3. intrude mandibular incisors, and 4. flare the maxillary and/or mandibular incisors.[6] The present patient had a normal mandibular plane angle, so the first treatment option was not suitable. However, the last three options were viable approaches.

The appliances used to correct the deep bite were bite turbos to intrude the upper and lower incisors, and brackets with increased torque to flare-out the maxillary anterior teeth. Furthermore, bite turbos open the posterior occlusion to facilitate arch leveling, and improve the effect of early light elastics for Class II correction. The posterior teeth may extrude when using bite turbos combined with Class II elastics usage, thereby increasing the mandibular plane angle. However, the normal mandibular plane angle of the current patient provided some tolerance for increasing the mandibular plane angle. On the contrary, protraction of the upper and lower right posterior teeth may help control the mandibular plane angle. For the current patient the mandibular plane angle decreased 2° (*Fig. 9, Table 1*) which may be related to molar protraction, as well as to improved bilateral occlusal function.

Posteriorly-inclined upper incisors are a problem when using bite turbos.[7] The retroclined maxillary incisors must be corrected first, or the problem will worsen because of the biting force due to lower incisor occlusion tends to rotate the upper incisors clockwise (*Fig. 34*). This was why the bite turbos were not bonded early in the treatment, but 10 months later.

Flaring of lower incisors is a common complication

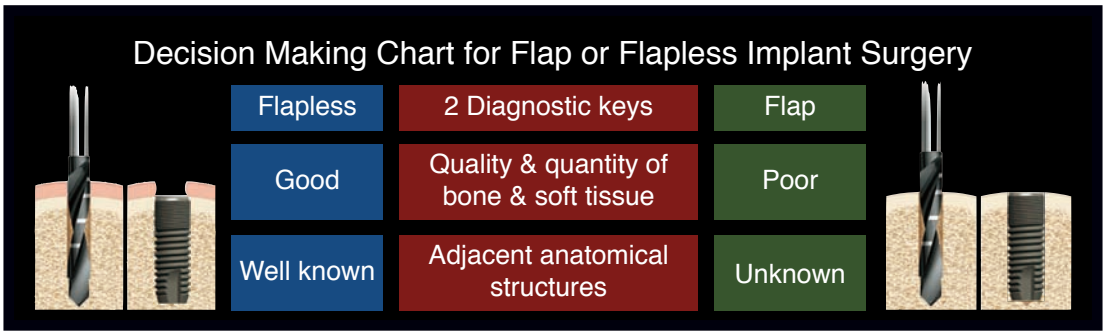

Fig. 34:

Choosing between a flapless or flapped approach depends on quality and quantity of both bone and soft tissue, as well as a detailed knowledge of the anatomy of critical structures near the implant site.

for Class II elastics. This problem can be controlled by using lower incsior brackets with decreased torque. Another option is bilateral infrazygomatic crest miniscrews to correct the Class II relationship rather than depending on Class II elastics.

The mesio-distal space maintained for the maxillary left implant site was based on multiple factors: tooth position, occlusal relationship, and bucco-lingual bone thickness. The position of the missing teeth and the opposing dentition (*mandibular left 1st molar*) indicated that the implant-supported prosthesis should be a molar-sized crown. The final decision of mesio-distal width for the implant site should be determined after the finish occlusion is nearly achieved. The alveolar ridge of the implant site had a bucco-lingual slope and insufficient bone thickness for a large diameter (> 5 *mm*) implant placement. The implant size chosen in this case was 4.3 mm in diameter. An implant smaller than 4.3 mm should be placed deeper in the bone to achieve an appropriate emergence profile as well as to resist flexure due to functional loading. The predicted future implant size and the desired occlusal relationship (*Class I molar*) indicated that an 8 mm mesio-distal space for implant placement was reasonable.

Flapless surgical technique, as a method for dental implant placement, is gaining popularity among implant surgeons. Advanced 3D dental imaging, particularly with cone beam computed tomography (*CBCT*), treatment planning software and computer generated surgical guides, the flapless implant surgical approach has a predictable outcome with a high success rate, especially in properly selected cases.[8] Flapless implant surgery has numerous advantages, including preservation of the vessels around the implants, maintenance of the original mucosal form around the implants, and retention of hard tissue volume at the surgical site. This method also shortens the length of the surgery, improves patient comfort, and accelerates recovery.[9] Flapless surgery has some significant limitations: 1. poor control of precise drilling depth because of difficulty in determining the precise entry point into the alveolar bone, 2. inability to preserve keratinized gingiva with a tissue punch perforation, and 3. poor ability to assess the precise osteotomy point of entry. Thus flapless surgery is primarily for implant sites where there is sufficient quantity and quality of bone, as well as a substantial quantity of keratinized gingiva.[10]

In this case, the surgical site was the maxillary left 2nd premolar area, which is less esthetically demanding and the chance of nerve damage is minimal. There was sufficient keratinized gingiva and no buccal undercut was detected on the alveolar bone surface. Some difficulties were apparent such as the bucco-lingual slope of the alveolar ridge and limited bone height, so it was essential to carefully plan the surgery to achieve a successful outcome. Surgical stent fabrication is important for flapless implant surgery to achieve a precise mesio-distal, bucco-lingual, and axial position of the implant. Precisely determining soft tissue thickness is an essential step for following the 2B-3D rule.1 There are 2 ways to measure the soft tissue thickness: 1. indirect and 2.

direct. An indirect approach is to use a radio-opaque material, such as zinc oxide eugenol temporary cement, applied to the outer surface of the surgical stent to illustrate the contour of the future prosthesis. Another radio-opaque material, high viscosity impression putty, can be inserted into the inner space of the stent producing a white outline of the soft tissue in a 3D image. A direct method is bone sounding using a periodontal probe can be carried out before the surgery to detect the soft tissue thickness.

According to Chang's Sinus Lift Decision Tree (*Fig. 35*),[11] a short implant of 6-8 mm was indicated for a patient with 6-8 mm bone height and normal occlusion. However, the limited bone height (*9 mm buccally and 7.5mm palatally*) was a concern for an 8 mm implant. Particularly for the flapless approach, it was very important to focus on the tactile feedback of bone density when performing the osteotomy to prevent the sinus floor from being perforated. The apical diameter of the implant fixture was larger than the corresponding osteotomy tool that prepared the site. This approach provides for better initial stability, but may have caused damage to the sinus membrane when the implant was seated, so PRF was used as a cushion to prevent sinus floor perforation.

Platelet-rich fibrin (*PRF*) is a simple, natural, and inexpensive blood product that is prepared by centrifugation of whole blood drawn into a tube without anticoagulant. PRF is moderately strong and is easy to handle.[12] The success of this technique depends on the time gap between the blood collection and its transfer to the centrifuge, and it should be done in the least time possible.[13]

PRF is an autologous fibrin matrix that is rich in platelets, leukocytes, and growth factors. The strong fibrin matrix can protect the denuded wound tissues and provide a scaffold for cell migration during the tissue repair process. Furthermore, fibrin also serves as a reservoir for cytokines and growth

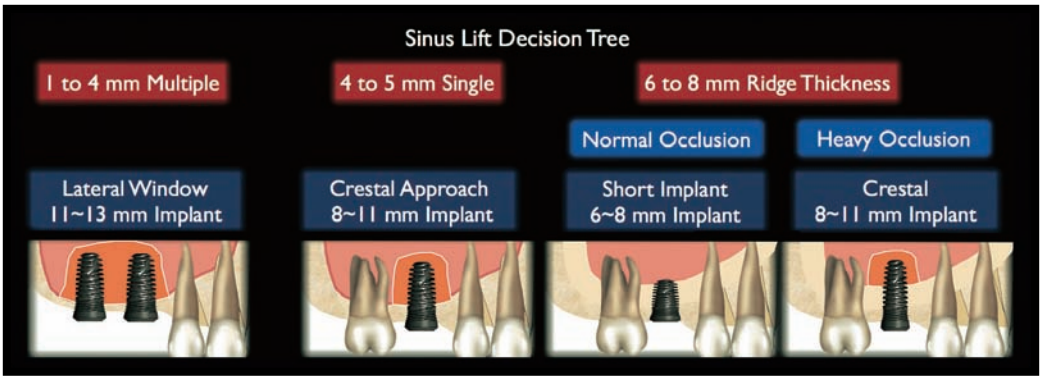

Fig. 35:

Management of the maxillary sinus primarily depends on residual bone height, implant length, and amount of bone grafting required. It is also important to evaluate the probable loading of the implant-supported prosthesis.

factors that ensure their slow release. Many studies have used PRF for various procedures and found it to accelerate soft and hard tissue healing, such as periodontal surgery, implant placement and sinus floor augmentation.[12] There also are some studies which report that using PRF as sole filling material is a reliable surgical option promoting natural bone regeneration both in osteotome-mediated or lateral window sinus floor elevation with simultaneous implantation.[12, 14-17] The PRF used for the present patient to act as a bone cushion to ensure sinus floor integrity when the oversized implant was seated. An additional benefit was to promote the healing process.

The post-treatment CT images showed that the sinus membrane was intact and the implant appeared to be placed right on the bone septum. The 2 mm buccal bone thickness was sufficient for an adequate emergence, which strictly followed the 2B-3D rule.[1] However, there some bone dehiscence on the palatal surface which may be a consequence of the sloping alveolar ridge before implant placement. This anatomical problem may result in some implant fixture exposure in the future. Fortunately, the implant is located in a less esthetically demanding area, and the thick palatal soft tissue is more resistant to soft tissue clefting. In retrospect, a more predictable, longterm outcome may have been achieved by either placing the implant 1~1.5 mm deeper with simultaneous sinus floor elevation, or using open flap surgery to perform bone expansion. However, the more invasive surgical procedure damages implant site tissues, complicating the healing process, and is less comfortable for the patient.

A major cause of failure for implant-supported prostheses after occlusal loading is attributed to occlusal overload.[18]

Therefore, appropriate occlusal adjustment for an implant-supported prosthesis is essential for its long-term prognosis. Klineberg et al.[19] recommend axial loading of implants by cradling supporting cusps in the opposing tooth central fossa, and constructing an occlusal surface with a wide fossa, reduced cusp inclination and wide grooves. Single-tooth implant crowns should have 10 µm shimstock clearance at the intercuspal position in centric occlusion. Posterior contact during excursive movements is discouraged.[19] According to Weinberg and Kruger,[20] every 10° increase in cusp inclination, there is approximately a 30% increase in lateral loading of the implant/prosthesis. When comparing photos taken before and after the occlusal adjustment (*Fig. 36*), the implant crown buccal cusp slope and height were constructed to decrease the susceptibility for occlusal trauma.

Conclusion

Dental treatment for adult patients is usually complicated and time-consuming because of compromised oral hygiene, multiple carious lesions, and acquired malocclusion. To ensure

Fig. 36:
The height of the buccal cusp on the implant-supported prosthesis was decreased to minimize lateral loading and the potential for occlusal trauma during functional excursions of the mandible.

the long-term success, the treatment plan must consider both facial esthetics and occlusal function. Preprosthetic orthodontic treatment was essential for redistributing space and achieving an acceptable occlusion. Soft tissue and dental esthetics when smiling was dramatically improved.

Flapless implant surgery results in reduced post-operative bleeding, patient discomfort, surgical placement time, and healing interval before restoring occlusion. However, this method requires more thorough treatment planning and surgical skill compared to conventional methods. Advancements in digital imaging and computer guided surgery are rapidly simplifying the flapless method.

The outcome for the current case was gratifying to both the patient and clinician. However, it is important to carefully assess and quantify the results to identify deficiencies. Focusing on the pattern of residual problems helps develop a more simplified methodology to produce consistent longterm results. No case is perfect, so analyzing details is an opportunity to develop a more predictable treatment philosophy to guide interdisciplinary care.

Acknowledgment

Thanks to Teacher Paul Head, Dr. Chuan-Wei Su and Chang-Kai Chen for proofreading this article.

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Discrepancy Index Worksheet

Total DI Score 36

OVERJET

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

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

Total = 2

OVERBITE

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

Total = 5

ANTERIOR OPEN BITE

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

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 4

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° 0 = 4 pts.

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

Each degree > 6° 1 x 1 pt. = 1

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 = 5

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

Identify: Molar protraction

Total = 7

IMPLANT SITE

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

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

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

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) = 0

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) = 0

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

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

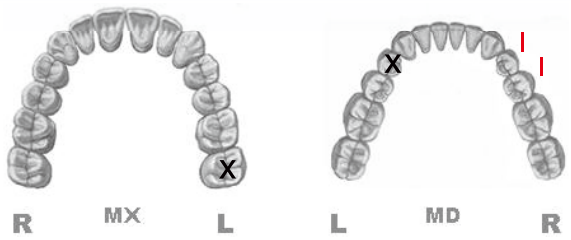
Total = 5

Cast-Radiograph Evaluation

Total CRE Score 20

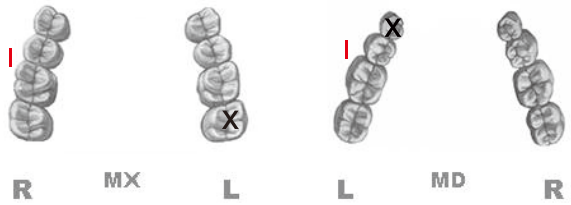
Alignment/Rotations

2



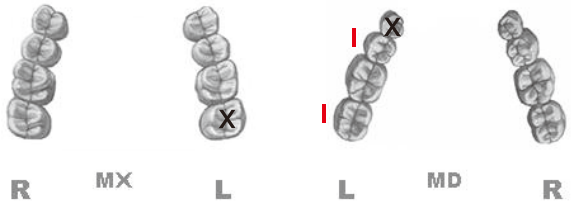
Marginal Ridges

2



Buccolingual Inclination

2

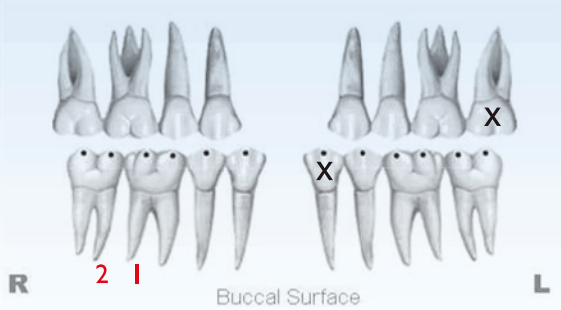


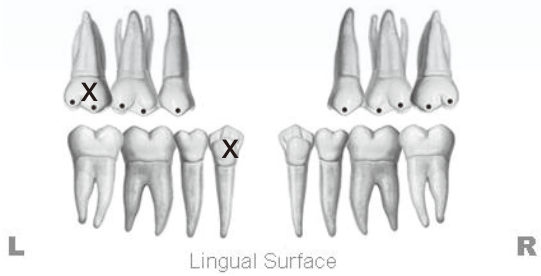
Overjet

0

Occlusal Contacts

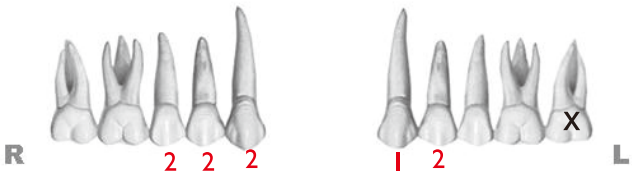
3





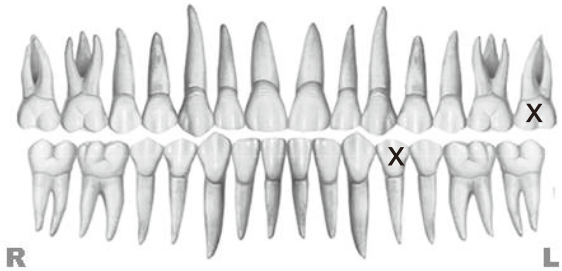
Occlusal Relationships

9



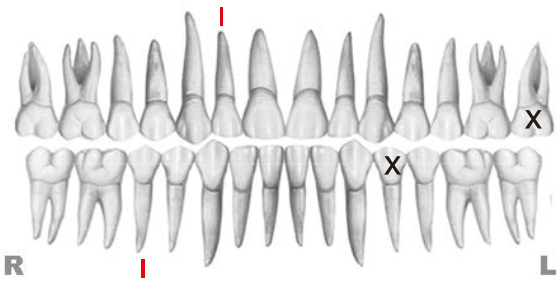
Interproximal Contacts

0



Root Angulation

2



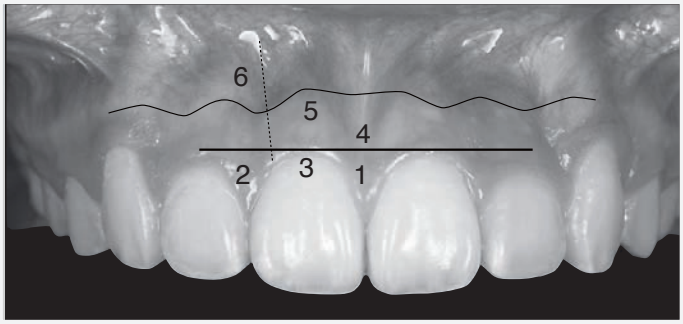
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

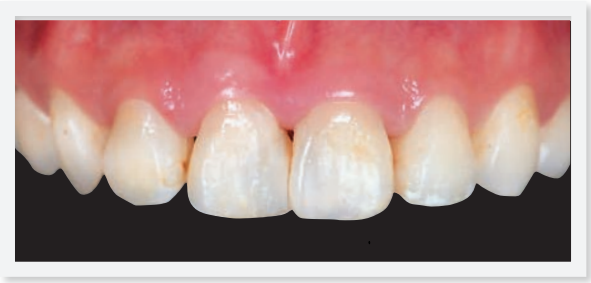
Total Score: = 3

1. Pink Esthetic Score

Total = 2



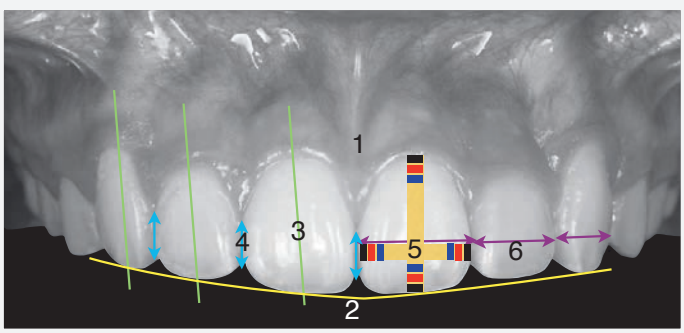
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



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

2. White Esthetic Score (for Micro-esthetics)

Total = 1



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

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

IBOI Pink & White Esthetic Score for Implant Restoration

1. Pink Esthetic Score

Total = 1

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

2. White Esthetic Score (for Micro-esthetics)

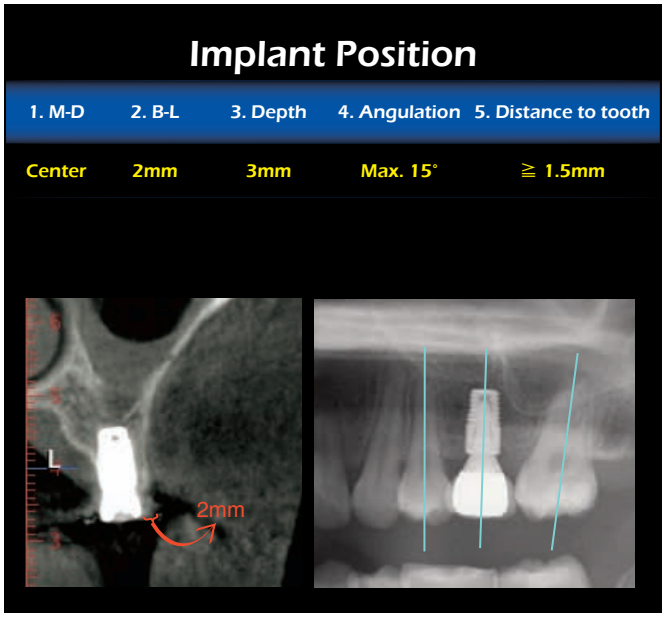
Total = 0

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

Implant-Abutment Transition & Position Analysis

3. Implant Position

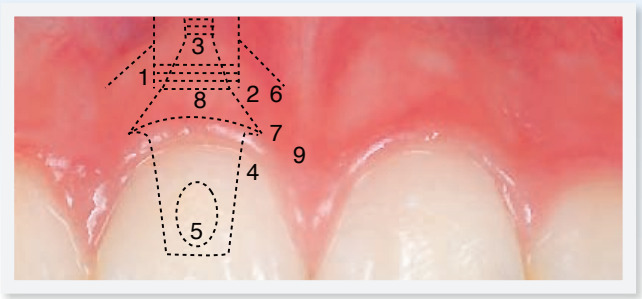
Total = 0



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

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

2. Abutment transition Contour



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

Total = 1

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

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

2014 贝多芬正畸精英班

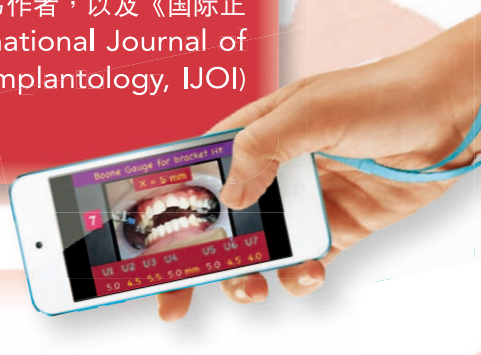
Beethoven Damon, OBS & Excellent Finishing Workshop

讲师：张慧男医师

现任贝多芬正畸植牙集团负责人，于1996年取得美国印第安那普渡大学齿颚正畸研究所博士学位，也是《国际正畸植牙期刊》(International Journal of Orthodontics & Implantology, IJOI) 发行人。他长期致力于正畸植体 (orthodontic bone screws) 的研发及运用。

讲师：林锦荣医师

现任林锦荣齿列正畸中心院长，于美国马楷大学取得正畸硕士学位，是一位国际知名的正畸讲师，他同时也是《创意正畸》(Creat ive Orthodontics) 一书作者，以及《国际正畸植牙期刊》(International Journal of Orthodontics & Implantology, IJOI) 的顾问。



亲爱的张医师：

[...]我身为一位讲师和正畸医师，透过这次台湾学习的经验，获得很多专业上的成长。我带回了最新、最棒的知识、技术和实用的工具，包含如何利用苹果电脑制作一流的简报，这一切都要归功于您的指导。我也在迷你骨钉的运用和治疗优点上，获得许多宝贵的学术参考资料。

除了对您万分的感谢外，我也要感谢您热心助人的夫人，以及您专业的诊所员工。在他们身上我看到了一种组织、关怀和功能性的模范。我永远不会忘记我在贝多芬集团学习期间所获得的关注和协助，不论每个人所担任的角色和功能[...]。

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

亲爱的张医师：

[...]我只能说这个课程远远超乎我的期望，这真是太棒了的学习经验。张医师和林医师世界级的演讲，以及您们多年累积的知识、经验和智慧，都反映在您们所呈现的案例中。我也很珍惜有机会在您忙碌的诊间，观摩着您如何积极、轻松地实践您在课程上所传授的秘诀。

首先，身为极具创意的教育家，您鼓励我们要有创造力来思考治疗方式。其次，您介绍我们您的工作系统，以及Damon及OBS这些工具来帮助我们在自己的实务工作中也获得成功。最后，您激励我们要持续改进这个系统。我个人由衷感谢您给我们的这三个建议[...]。

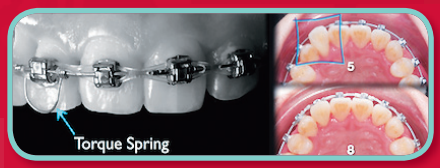
John K.S. Tong, DDS, MAGD
Cupertino, California USA

精致的正畸完工 实际操作课程
Excellent Finishing Workshop

精致的正畸完工为半天的实际操作课程，学习重点如下：

1. 正畸器位置的黏着（Bonding Position）
2. 三步弯丝法（Third Order Bend）

3. 单个牙转矩调整 (Torque Spring)



4. 前牙转矩调整 (Anterior Root Torque)

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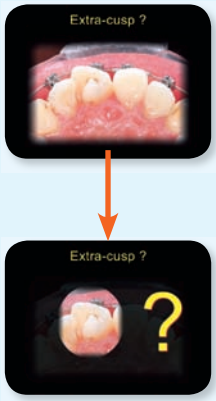
让您轻松制作吸睛简报！

「我使用 Keynote、当 Keynote 的讲师已经九年了。今年六月，我有了参加金牛顿高效简报课程的机会，令我讶异的是，我仍然从这堂理应是基础的课程中学到很多。



如果你把这堂课想成一步步教导你如何使用 Keynote 软件的电脑课的话，要请你三思。这堂课是教你实用的诊间简报技巧，上过这堂课，我保证你们都会再重新检视你们的简报，并制作出更好的牙科诊疗简报。

如果你想要增进你与患者间的沟通，那么，这八小时的课程无疑值得你来上。」

~ Dr. Rungsi Thavarungkul, Thailand
进阶 Keynote 课程－精修绘图简报达人讲习班讲师

贝多芬正畸精英班

第一天

09:00—09:30	课程简介
09:00—10:30	贝多芬Damon系统运用
10:30—11:00	休息
11:00—12:00	精致的正畸完工 案例示范
12:30—13:30	午餐
14:00—15:00	儿童牙科、植牙中心参观
15:00—18:30	正畸门诊见习

第二天

09:00—10:30	Optimized Orthodontic Treatment I 优化正畸治疗 (1) *Dr. Chris Chang*
10:30—11:00	休息
11:00—12:30	Optimized Orthodontic Treatment II 优化正畸治疗 (2) *Dr. Chris Chang*
12:30—13:50	午餐
14:00—15:00	OBS 模型实作
15:00—18:30	正畸门诊见习

第三天

09:00—10:00	美学上的修整 Esthetic Finishing
10:00—10:10	休息
10:10—12:30	Damon + OBS *Dr. John Lin*
12:30—13:30	午餐
14:00—17:00	精致的正畸完工实际操作课程 Excellent Finishing Workshop

第四天

09:00—10:00	Keynote 简介：组织简报用的患者档案
10:00—10:10	休息
10:10—11:30	高效简报要点 (1)
11:30—13:30	午餐
14:00—15:30	高效简报要点 (2)
15:30—15:45	休息
15:45—17:00	信息视觉化

贝多芬正畸精英班

包含三场半天的演讲，两场半天的门诊见习，两堂模型实作课程。

学费包含当地交通费、餐费及两天的住宿费（两人同住一间房）；机场接送需额外收费。

学费： RMB 15,000
指定日前报名优惠 RMB12,500

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包含一天的演讲及实作课程，焦点放在强化您的专业数码沟通技巧。此讲习班需要使用苹果作业系统 (Macintosh) 以及苹果原厂简报软件 Keynote '09.

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Compensated, Asymmetric Class II Malocclusion with Horizontal Impaction of Mandibular Second Molars

History and Etiology

A 19-year-10-month-old male presented for orthodontic consultation with chief complaints of delayed eruption of mandibular molars, poor masticatory function and irregular dentition. He was previously advised by several orthodontists that extraction of the bilateral impacted lower second molars and replacement with dental implants was the only viable option for correcting his malocclusion with facial asymmetry (*Figs. 1-3*). There were no contributing medical, dental or family histories. Because it was bilateral, the etiology of the malocclusion appears to be a genetically-related aberrant path of eruption or ectopic position(*s*) of developing teeth. This difficult malocclusion was treated to an optimal result, as documented in Figs. 4-6.

Cephalometric and panoramic radiographs illustrate the pretreatment condition and the post-treatment results (*Figs. 7-8*). Superimposed cephalometric tracings before and after treatment (*Fig. 9*), as well as a table of cephalometric measurements (*Table 1*), document the treatment. Two different approaches, utilizing OrthoBoneScrews (*OBS*) anchorage, demonstrated that extraction of the mandibular third molar, and recovery of the deeply impacted second molar, was superior to extracting the second molar and alignment of the third molar. Several

Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment study models (casts)

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

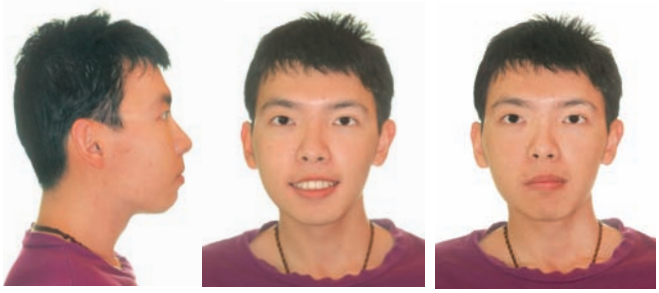

Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models (casts)

radiolucencies on the finish panoramic radiograph indicate that further treatment is needed on the side where the impacted mandibular molar was extracted.

Diagnosis

Skeletal:

- Skeletal Class II (*SNA 85°, SNB 80°, ANB 5°*)
- Mandibular plane angle (*SN-MP 30°, FMA 28°*) was within normal limits (*WNL*)
- Facial asymmetry: mandible deviated 3mm to the left

Dental:

- Left end-on Class II molar relationship
- Left Class II canine
- Both the OJ and OB were 4 mm
- 4 mm space deficiency for lower arch

Facial:

- Convex profile with protrusive lower lip (*Fig. 1*)

The American Board of Orthodontics (*ABO*) discrepancy index (*DI*) was 32, as documented in the subsequent DI worksheet, documents the complexity (*severity*) of the malocclusion. A DI >20 is considered a major malocclusion.

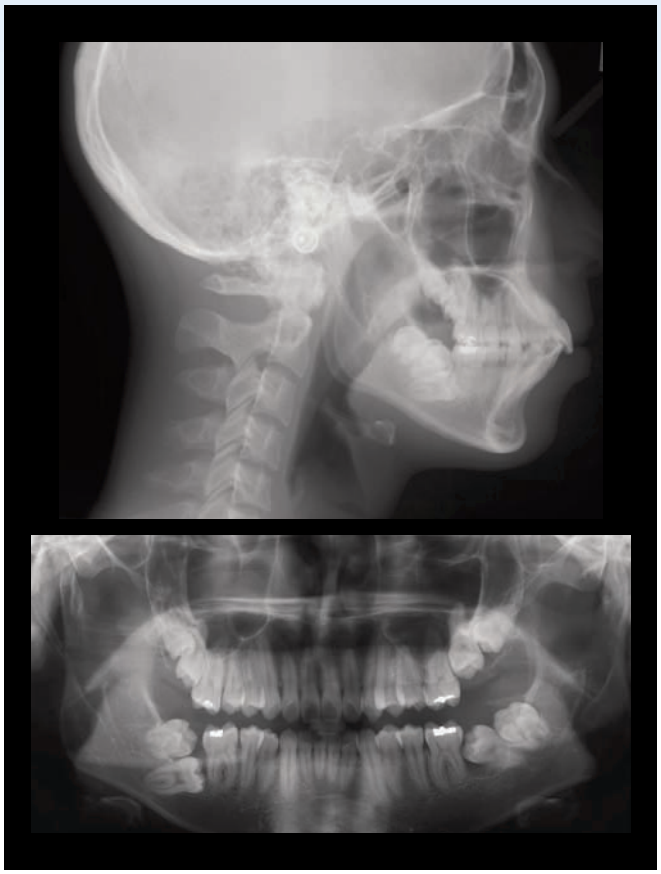

Fig. 7: Pretreatment pano and ceph radiographs

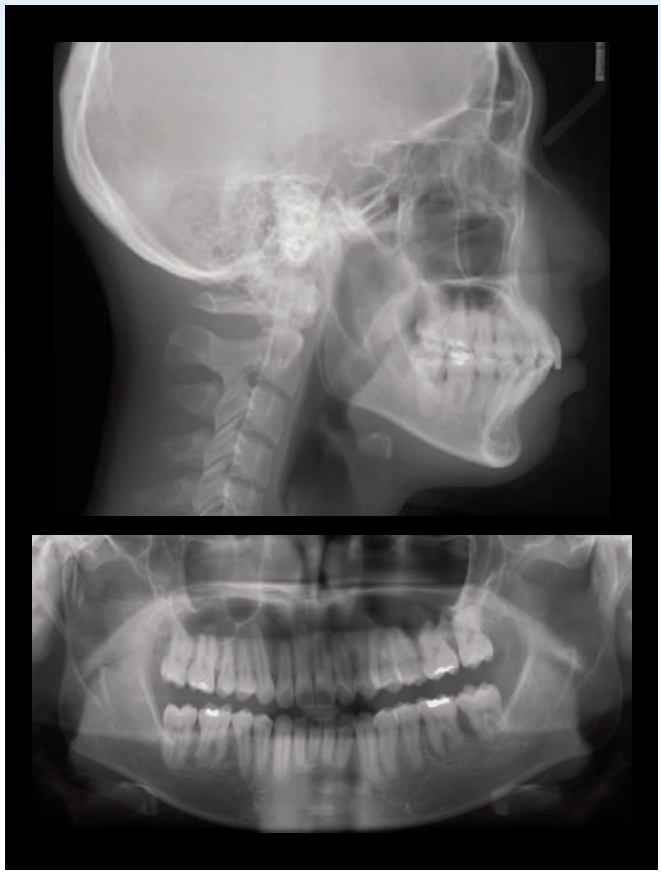

Fig. 8: Posttreatment pano and ceph radiographs

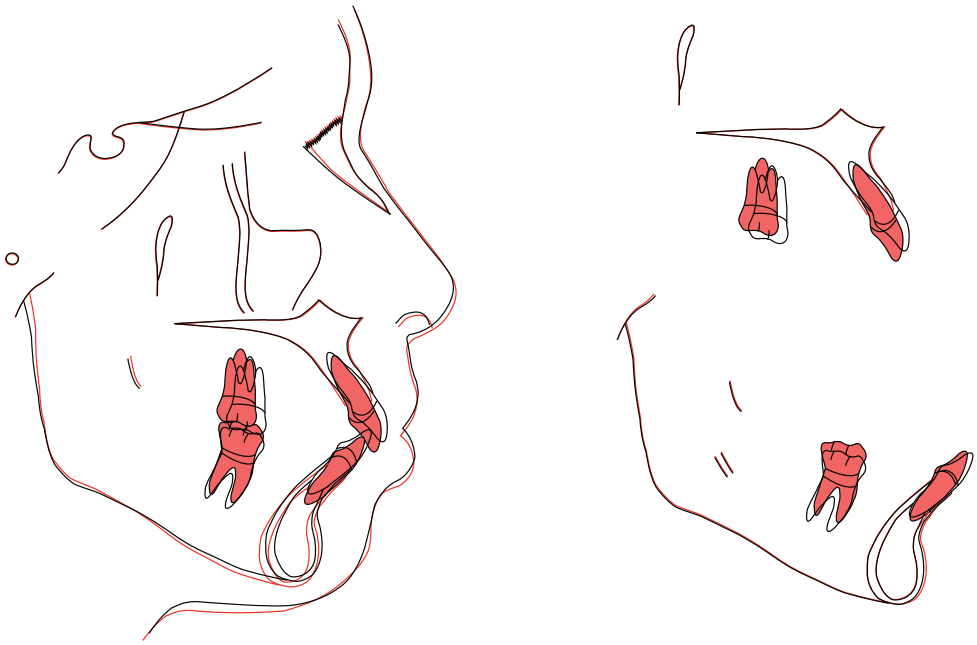

Fig. 9:

Superimposed cephalometric tracings show a slight opening of the vertical dimension of occlusion (VDO) and clockwise (posterior) rotation of the mandible. Superimposition on the maxilla revealed retraction of the entire arch, extrusion of the anterior segment, and intrusion of the molars. The mandibular superimposition documented retraction of the incisors and extrusion of the molars.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	85°	85°	0°
SNB°	80°	79°	1°
ANB°	5°	6°	1°
SN-MP°	30°	32°	2°
FMA°	28°	30°	2°
DENTAL ANALYSIS			
U1 TO NA mm	8 mm	5 mm	3 mm
U1 TO SN°	117°	107°	10°
L1 TO NB mm	12.5 mm	11mm	1.5 mm
L1 TO MP°	111°	105°	6°
FACIAL ANALYSIS			
E-LINE UL	0.5 mm	-0.5 mm	1 mm
E-LINE LL	5 mm	4 mm	1 mm

■ Table 1: Cephalometric summary

Specific Objectives of Treatment

The overall objective of treatment was aimed at achieving a full 28 tooth, bilateral Class I molar and canine relationships with ideal overjet and overbite. Specific treatment objectives were:

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition :

- A - P: Retract to correct Class II buccal segments and excessive overjet
- Vertical: Maintain
- Inter-molar / Inter canine Width: Expansion to relieve lingual cross-bite of LL 1st molar (#*19*)

Mandibular Dentition:

- A - P: Tip incisors distally
- Vertical: Maintain
- Inter-molar / Inter-canine Width: Expand constricted buccal segments to relieve crowding

Facial Esthetics:

- Retract lower lip to improve facial balance

Treatment Plan

Extract the upper 3rd molars (#*1, 16*), lower right 3rd molar (#*32*), and lower left 2nd molar (#*18*). Install the passive self-ligating bracket system (*Damon D3MX*). Utilize four extra-alveolar OBS (*2mmx12mm SS*): 1. right ascending ramus to recover #31, 2. bilatral infrazygomatic crests to correct asymmetric Class II, and 3. protract and rotate #17. Detail, remove fixed appliances, and finish with a positioner. Retain with a fixed anterior retainer in the lower arch and a clear overlay on the upper arch.

Appliances and Treatment Progress

The patient was referred to extract #1, 16, 18, and 32 before the start of orthodontic treatment. An .022" Damon D3MX® low torque brackets (*Ormco*) were bonded on both arches. The initial archwires were .014" CuNiTi. Bite turbos constructed with Fuji glass Ionomer cement were bonded on the mandibular 1st premolars to accelerate the correction of #19 lingual cross-bite and the level both arches (*Figs. 10-11*). In the 6th month of treatment, brackets were rebonded on #3 and 14 to correct an inadvertent reversal (*Figs. 12-13*). Radiographs were used to evaluate the

Fig. 10:

Bite turbos constructed with glass Ionomer cement (GIC) were bonded on the mandibular 1st premolars.

Fig. 11:

It is important that the bite turbos come into occlusion simultaneously. Note contact on left side (arrow) but a lack of contact on the right side. Add GIC until bilateral posterior contact is achieved to prevent TMJ discomfort.

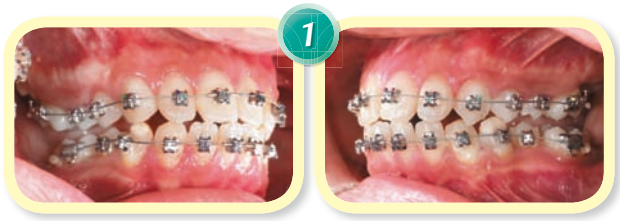

Fig. 12:

In the first month of treatment (1), it was noticed that brackets were inadvertently reversed for teeth #3 and 14. Note that the hooks are on the distal.

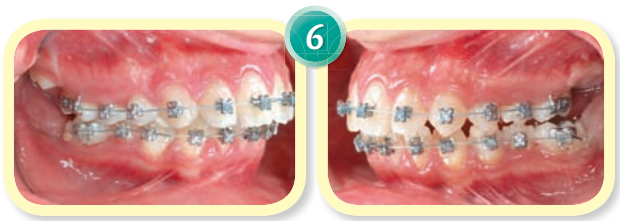

Fig. 13:

At six months of treatment (6), the maxillary first molar brackets were rebonded in the correct positions.

eruption of #31 following extraction of #32 (*Fig. 14*). After seven months of observation, it appeared that #31 was blocked from further eruption by the cortical bone of the ascending ramus. An OBS (*2mmx12mm SS*) was installed and bone was removed down to the CEJ on #31 (*Fig. 15*). The second molar was slightly luxated with an elevator to confirm that it was not

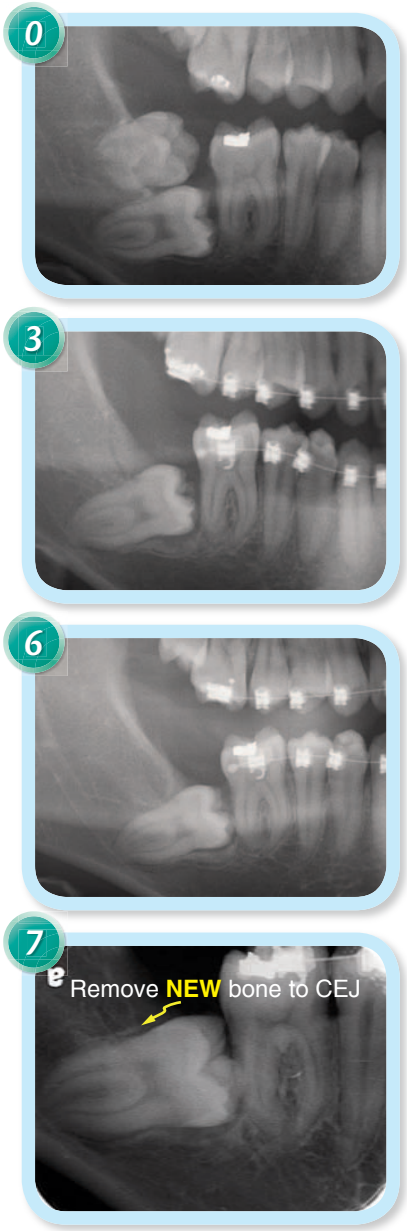

Fig. 14:

Radiographic summary of #31 recovery shows the pretreatment view (0 mo), followed by three months of healing after #32 was extracted (3 mo). Note #31 was starting to erupt and upright but was inhibited by cortical bone (6 mo). It is important to remove bone down to the CEJ (7 mo).

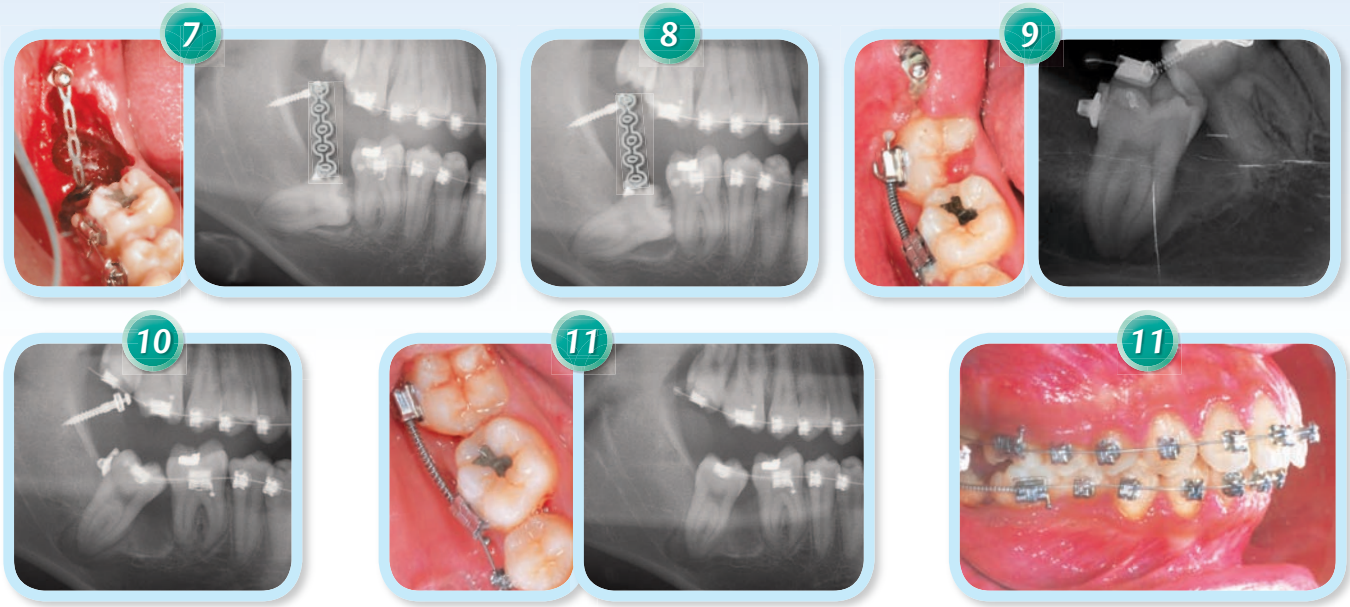

Fig. 15:

Documentation for the treatment of the lower right second molar from 7-11 months shows the uprighting and alignment sequence.

ankylosed. An eyelet was bonded on the distal surface of #31 and a power-chain was stretched between the eyelet and the OBS to achieve extrusion and uprighting (*Fig. 15*). One month later (*8 months of treatment*), a panoramic radiograph revealed #31 had moved ~2mm occlusally. In the 9th month of treatment, #30 was rebonded, #31 was bonded on the buccal surface, and an open coil spring applied between the molars to upright #31 (*Fig. 15*).

Figs. 16-18 show the steps for alignment and retraction of the maxillary buccal segments. At 9 months, #2 and 15 were sufficiently erupted for bonding brackets and placing a .014 CuNiTi archwire (*Fig. 16*). By 11 months the upper 2nd molars had erupted considerably (*Fig. 17*).

Seventeen months into treatment, bilateral infrazygomatic OBSs were installed and elastic chains were stretched between the miniscrews and the maxillary canines bilaterally (*Fig. 18*).

Fig. 16:

After extraction of #1, 16, both maxillary 2nd molars (#2, 15) are erupting spontaneously nine months into treatment. They were bracketed and a .014" CuNiTi arch-wire was inserted from teeth #2-15.

Fig. 17:

At 11 months of treatment (two months later) #2 and 15 are much closer to occlusion.

Fig. 18:

At 17 months of treatment, two bone screws (2mm x 12mm SS) were installed in the infrazygomatic crests and the power chains were applied to retract ("distalize") the whole maxillary arch.

Nine months into treatment, a diode laser was used to remove soft tissue covering #17 so that a tube could be bonded on the occlusal surface. In the 10th month of treatment, the impacted #17 was surgically uncovered down to the cementoenamel junction (*CEJ*), and uprighting was activated with an .016 CuNiTi arch-wire (*Fig. 19*). In the 12th month of treatment, the upper arch-wire was changed to .014x.025" CuNiTi, the lower arch-wire was

Fig. 19:

Summary of the lower left third molar treatment from 9-37 months demonstrates the technical problems in achieving optimal alignment.

changed to .018" CuNiTi, with an open coil spring applied between #17 and 19 to upright the partially impacted #17 (*Fig. 19*). In the 16th month of treatment, the upper arch-wire was changed to .017x.025" low friction TMA. In the 17th month of treatment, infrazygomatic bone screws (*2mmx12mm SS*) were installed and activated with power chains to retract the whole upper arch (*Fig. 18*). In the 20th month of treatment, a panoramic radiograph was exposed to evaluate the #17 position relative to the occlusal plane (*Fig. 19*).

In the 21th month of treatment, #17 was rebonded, placing the bracket on the buccal surface of the tooth which was oriented to the distal (*90° rotation*), and the lower arch-wire was changed to .018" CuNiTi with a power chain to rotate #17 (*Fig. 19*). In the 23th month of treatment, a bone screw (*2mmx12mm SS*) was installed in the left mandibular buccal shelf and a chain of elastics was applied to rotate #17 (*Fig. 19*). In the 30th month of treatment, the bracket on #17 was removed and a lingual button was bonded to upright #17 with a cross elastic. In the 33th month of treatment, the OBS in the buccal shelf and lingual button were removed (*Fig. 19*).

In the 34th month of treatment, the upper arch-wire was changed to .019x.025" SS, the lower arch-wire was changed to .016x.025" SS. To expand the upper arch-wire and constrain the lower for coordination of the inter-arch relation. In the 37th month of treatment, a panoramic radiograph was exposed to evaluate bracket positions relative to the axial inclinations of all teeth. A large radiolucency was noted between #17 and 19. Brackets were rebonded on #21, 28, 30 for final detailing and the lower arch-wire was changed to .014x.025" CuNiTi. In the 39th month of treatment, a tooth positioner was fabricated for final alignment (*Fig. 20*). After 40 months of active treatment, all appliances were removed (*Fig. 21*). Upper clear and lower fixed anterior retainers were delivered as planned.

Fig. 20:

At 39 months of treatment, a tooth positioner was fabricated for final detailing of the occlusion. The upper photograph shows the non-active position, the lower view shows the active position (clenching).

Fig. 21:

At 40 months of treatment (after one month of positioner wear) an optimal final alignment is achieved.

Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: Maintained
- Vertical: Clockwise rotation and a slight opening of mandibular plane angle ~ 2 degree
- Transverse: Maintained

Maxillary Dentition:

- A - P: Incisors were extruded and tipped lingually
- Vertical: Extrusion of the incisors and intrusion of the molars, steepening the plane of occlusion
- Inter-molar / Inter-canine Width: cross bite corrected with arch expansion in the first molar area

Mandibular Dentition:

- A - P: Slight lingual tipping of the incisors
- Vertical: molars extruded, steepening the plane of occlusion
- Inter-molar / Inter-canine Width: Expanded 2-3mm to correct constricted archform

Facial Esthetics:

- Little change in facial profile or lip protrusion

Retention

Upper clear overlay and lower fixed 3-3 retainers were delivered, and the patient was instructed to wear them full time for the first six months and nights only thereafter. In addition, instructions in proper home hygiene and maintenance of the retainers were provided.

Final Evaluation of Treatment

The ABO Cast-Radiograph Evaluation score was 28 points and IBOI Pink & White score resulted in score of 6, as documented on forms appearing later in this report. The major discrepancies were uneven marginal ridges (*5 points*), buccolingual inclination of posterior teeth (*6 points*), loss of some occlusal contacts (*6 points*) and inadequate root parallelism existed between #12- 13, #21-22 and #28-29 (*3 points*). The latter resulted primarily from the uprighting, rotation and transposition of impacted molars in the lower arch. The OB was 3 mm, OJ was 3 mm, molar relationship was Class I bilaterally, but the profile was unchanged. Overall, the treatment results for this challenging case were pleasing for both the patient and the clinician, but there is concern about the loss of supporting bone on the mesial of #17. Using passive self-ligating brackets (*i. e., the Damon system*) and bone screws as anchorage was effective for managing this very difficult malocclusion (*DI = 32*) that was treated to an acceptable alignment result (*CRE = 28*). However, in retrospect it may have been wise to extract #32 and upright #31 to avoid the bone defect.

Discussion

Impaction of second molars is very uncommon in the maxillary arch, but the problem has an incidence

of 0.03% to 0.21% in the mandibular arch.[1,2] According to Andreasen et al.,[3] three main causes have been proposed for eruption disturbances: ectopic position, obstacles in the eruption path, and failures in the eruption mechanism. Failure of tooth eruption is associated with various systemic and local factors.[4] Heredity is also mentioned as an etiologic factor. Recently mutations in parathyroid hormone receptor 1 have been identified[5,6] in several familial cases of primary failure of eruption. Local factors related to the failure of eruption include malocclusion disturbances of the deciduous dentition, the position of the adjacent teeth, space deficiency in the dental arch, idiopathic factors, supernumerary teeth, odontomas, or cysts.[1,7,8] In the present case, impactions of all the third and second molars may be attributed to obstacles in the eruption path or ectopic position.[4,8,9] Since the problem is bilateral, and involves both arches, a genetic etiology is likely; however, there is no clear documentation for similar problems in the literature.

Impacted second molars hinder masticatory function and dental arch integrity. Treatment options for this difficult problem include extraction, surgical uprighting, transplantation, surgical-orthodontic intervention, dental implant replacement and innovative tip-back cantilever treatment.[7,8,10,11,12] The most aggressive method for treating the impacted mandibular molars is extraction. For the present case, extraction of #31 required careful technique to avoid injury to the inferior alveolar nerve and periodontal damage in the extraction site. It is unknown if the extraction or follow-up soft tissue surgery contributed to the bone loss mesial to #17 (*Figs. 8, 19 and 24*).

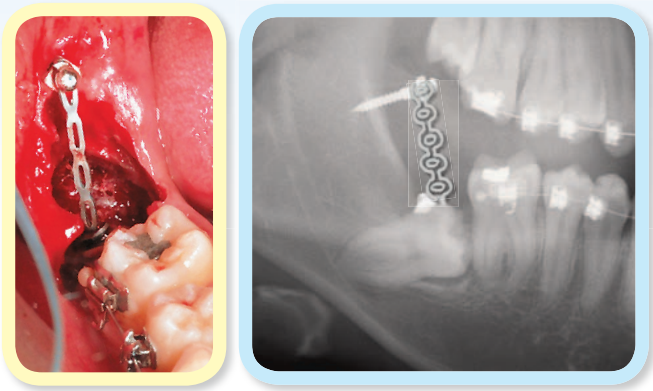

Fig. 22:
In recovering he impacted #31, the power chain to the OBS extrudes and uprights the molar because the force is applied occlusally to the center of resistance of the molar.

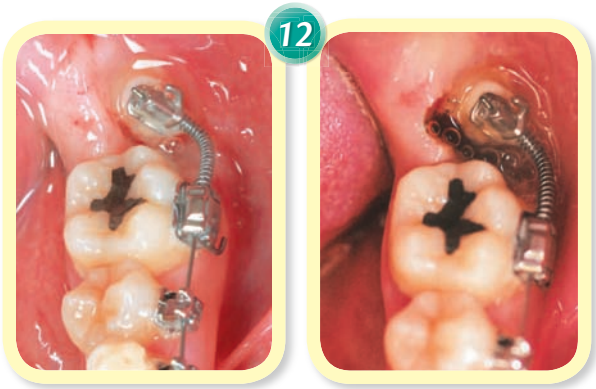

Fig. 23:
Gingivoplasty with a diode laser was necessary to remove the excessive mucosa lingual and occlusal to tooth #17.

Fig. 24:
Unfortunately, a bony defect was noted between #17 and 19. See text for details about this significant problem.

There are some important aspects for the successful recovery of second molar impactions. First, the lower 3rd molar should be extracted before the start of orthodontic treatment to provide a path of eruption. Second, it is important to remove all bone around the crown down to CEJ junction and leave an opening in the flap for the tooth to erupt.[13] Moreover, any obstacles in the designed pathway of eruption should be removed during the surgical procedure[14] and the impacted tooth should be slightly luxated with an elevator.[15] Third, a long bone screw (*2mm x 12mm SS*) is required for the ascending ramus to penetrate the thick soft tissue and resist motion due to temporalis muscle firing. Fourth, once the impacted second molar has been uprighted sufficiently, it should have a bracket bonded on the buccal surface to expedite alignment.[15]

At the end of active treatment, the tooth positioner was effective for improving occlusal and interproximal contacts.[16] There is no literature supporting the extraction of healthy impacted molars in favor of placing implants.[17] A healthy tooth has a life-long survival rate, which may or may not be true for a dental implant.

Numerous orthodontic appliances and techniques have been suggested for uprighting impacted molars. Some of the better documented methods are a variety of bonded attachments, spring fixed in a vertical lingual sheath, push coil springs, intermaxillary vertical elastics, removable appliance with an uprighting spring, as well as various applications of miniscrews and miniplates.[18-22] All of these methods have limitations when managing deeply impacted teeth.[23]

For the current patient, a mandibular second molar (*#18*) was extracted instead of the third molar. Because of the ectopic position, rotation and compromised axial inclination of #17, a long period of difficult treatment was required to align the third molar (*Fig. 19*). Furthermore, there was an excessive accumulation of fibrous mucosa overlying the the crown of the tooth that required a second gingivectomy with a diode laser (*Fig. 23*).[13] All of these procedures consumed considerable treatment time which risks the periodontal health of the affected area (*Fig. 24*) as well as the entire dentition (*Fig. 8*). In retrospect, it would have been wise to obtain a 3D image the area of the impactions. The buccolingual alignment problems with the impacted #17 are not apparent in the 2D pano or ceph (*Fig. 7*).

The response to orthodontic uprighting (*Fig. 22*) in the right mandibular posterior segment was gratifying, but the large bony defect between the left mandibular molars was disappointing (*Fig. 19*), and will require additional treatment. A careful reconsideration of the differential response to the two variations in treatment is in order. The bilateral second molar impaction problems appeared similar in the pretreatment panoramic radiograph (*Fig. 7*), but in retrospect subtle differences are evident. Although #31 was more deeply impacted than #18, the adjacent bone pattern was more favorable for orthodontic uprighting and alignment. The

large radiolucent area inferior to the crown of #18 was a concern because it may be a pathologic lesion such as a cyst that will not resolve when the tooth is uprighted. Based on 2D images, the decision was made to extract #18 with its follicle and orthodontically align #17. However, the position and alignment of #17 presented a formidable task as illustrated in Fig. 19. In addition, by the 13th month it was clear that the bone fill where #18 was extracted was much less favorable than for extraction of #32 (*Fig. 15*). Moving #17 into the defect did not resolve the problem (*Figs. 8 and 19*). Twelve months into treatment, it was necessary to again remove soft tissue to expose the crown of #17, and a closed coil spring was used for uprighting (*Fig. 23*). Although the bone defect was not obvious until 37 months, a compromised bone response on the mesial of #17 was evident by 20 months (*Figs. 8, 19 and 24*).

The extensive treatment necessary to resolve the molar alignment problems contributed to the relatively high score of 28 using the ABO Cast-Radiograph Evaluation. The major problems were poor axial inclination, marginal ridge discrepancies, and lack of occlusal contacts.

It is unclear what caused the bone loss between #17 and 19, but the most likely candidates are a low grade postoperative infection associated with one of the surgical procedures in the area, and/or a localized manifestation of periodontitis. Careful evaluation of the post-treatment panoramic radiograph reveals other areas of concern. Another area of bone loss is noted between #14 and 15, suggesting active periodontitis. There is also an unusual radiolucency involving the apical half of the mesial root of #19 which may be a periapical granuloma or cyst. Clearly these problems require immediate attention to preserve the benefits of orthodontic treatment. In particular, a through periodontal assessment is indicated. If the bone loss on the mesial of #17 cannot be corrected, it may be wise to extract #17 along with its antagonist #15. Otherwise the periodontal problem to like to compromise #19.

Conclusion

This case report is a comparison of two extraction patterns to resolve a challenging bilateral impaction of mandibular second molars. Extracting the third molar and uprighting the second molar produced the most ideal result. Extracting the second molar, combined with subsequent gingivectomy and extensive mechanics to align the third molar, resulted in severe bone loss on the mesial of the third molar. A bone screw installed in the ascending ramus was effective anchorage to recover the deeply impacted second molar. This very difficult malocclusion (*DI = 32*) was treated to an acceptable final alignment (*CRE = 28*), but several radiolucencies noted in the final panoramic radiograph require further evaluation and treatment.

Acknowledgment

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

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Discrepancy Index Worksheet

Total DI Score 32

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 = 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 = 2

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 = 1

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

Each degree > 99° 12 x 1 pt. = 12

Total = 13

OTHER (See Instructions)

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

Identify: Lower 2nd molars blocked out by 3rd molars

Total = 10

IMPLANT SITE

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

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

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

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

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

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

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

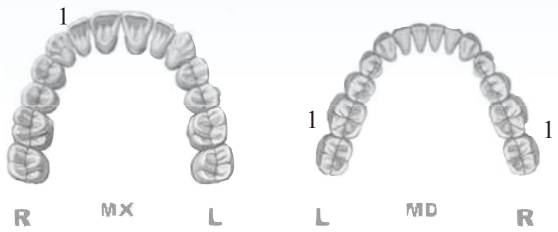
Total = 0

Cast-Radiograph Evaluation

Total CRE Score 28

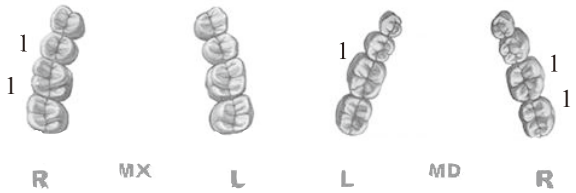
Alignment/Rotations

3



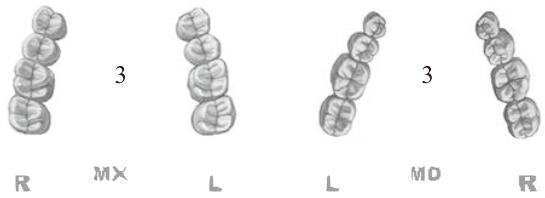
Marginal Ridges

5



Buccolingual Inclination

6

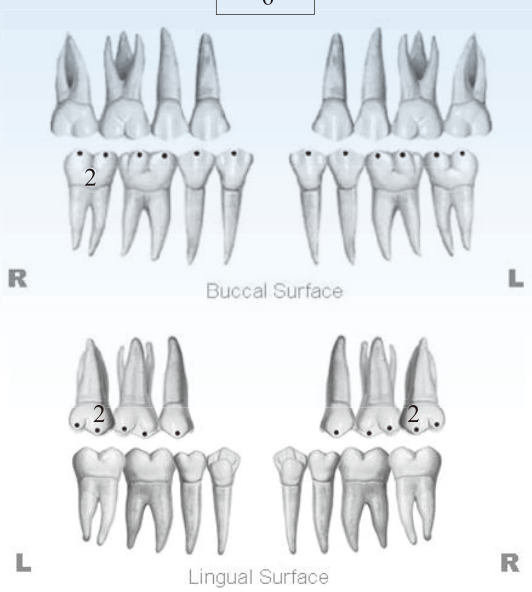


Overjet

1

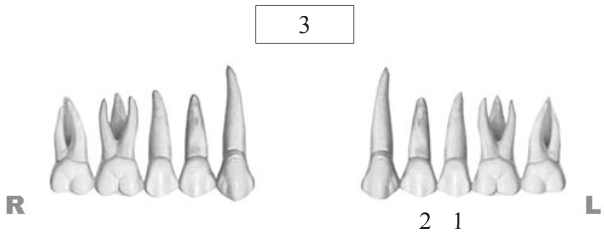
Occlusal Contacts

6



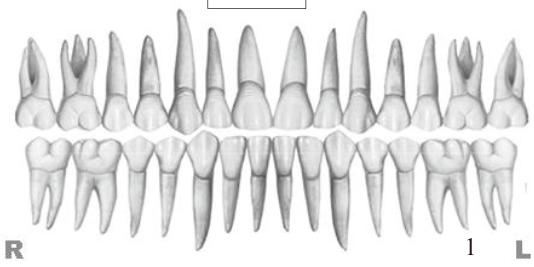
Occlusal Relationships

3



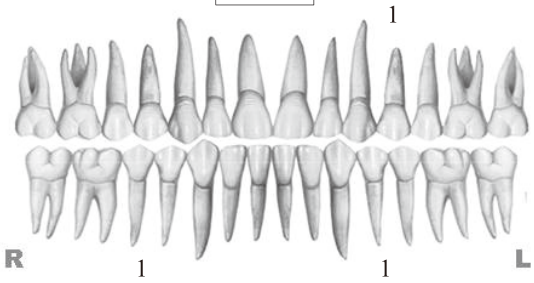
Interproximal Contacts

1



Root Angulation

3



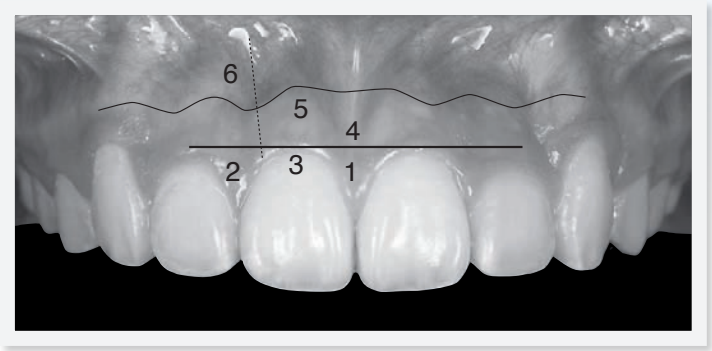
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 6

1. Pink Esthetic Score

Total = 3

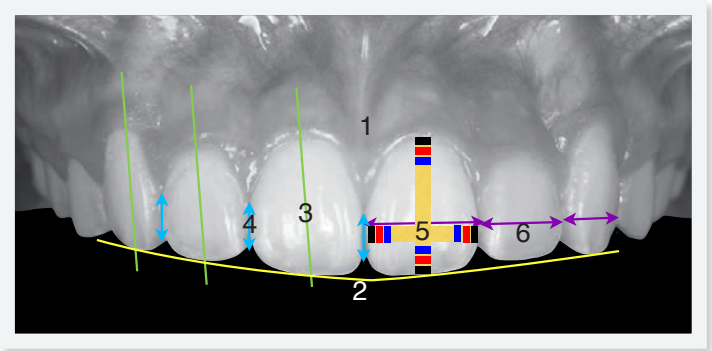


1. Mesial Papilla	0	1	2
2. Distal Papilla	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

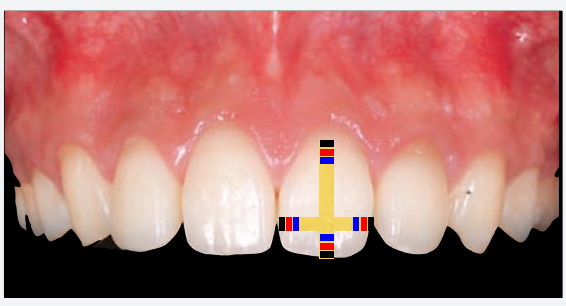
1. M & D Papillae	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	0	(1)	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	0	(1)	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 3



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



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

Treatment of Bimaxillary Protrusion, Blocked-Out Canine and Buccal Crossbite

History and Etiology

A 24-year-and-8-month-old female presented for orthodontic treatment (*Figs. 1-3*). Her chief complaints were protrusive profile and high (*blocked-out*) canine. There were no known history or habits contributing to the malocclusion. The clinical examination revealed a relatively long face with a steep mandibular plane angle and a tooth-size to arch-length discrepancy in both arches. This pattern suggests the malocclusion is primarily an environmental problem associated with relatively low biting strength associated with a history of less intensive masticatory loading.

However, the bilateral buccal crossbite of maxillary second molars suggests a contributing genetic component. To assess treatment progress, records were analyzed 13 months into treatment (*Figs. 4-8*). The final records documenting 26 months of fixed appliance treatment are shown in Figs. 9-11. The pretreatment (*Fig. 12*) and post-treatment (*Fig. 13*) radiographs are displayed in a comparative format. Superimpositions of pretreatment and post-treatment cephalometric tracings, document the treatment in the sagittal plane (*Fig. 14*). The details for diagnosis, treatment and outcomes assessment will be discussed in this case report.

Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment study models

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

Fig. 4: Progress facial photographs

Fig. 5: Progress intraoral photographs

Fig. 6: Progress study models

Diagnosis

Date of the pretreatment photographic (*Fig. 2*) and radiographic (*Fig. 12*) records was 11-08-2010. The study models (*casts*) were taken shortly thereafter, following the removal of the lower left 3rd molar (*Fig. 3*). As previously mentioned, intermaxillary crowding, and irregular dental display (*blocked out maxillary canine*) are probably environmental manifestations of the malocclusion (*Fig. 15*), while the bilateral buccal crossbites reflects a genetic predisposition (*Fig. 16*). The upper second molars had large restorations which required repair so the tooth could assume a normal occlusal contacts once the buccal crossbite was corrected (*Figs. 17*). Since the upper right third molar had no restorations, it was preferable to extract the second molar and replace it by moving the third molar mesially. Pretreatment study models (*taken after the removal of the lower left 3rd molar*), cephalometric and panoramic radiographs (*Figs. 3,12*) were used to document the complexity of the malocclusion. There was obvious crowding and irregular dental and gingival display (*Figs. 15*) and the specific posterior buccal crossbite is well documented on the casts (*Figs. 16*). The upper second molars had restorations which required repair (*Figs. 17*). The ABO Discrepancy Index (*DI*) was 29 as shown in the subsequent worksheet.

1. Angle Classification: Bilateral Class I molar relationship

2. Tooth Size Arch Length Discrepancy:

- Maxillary: -8 mm
- Mandibular: -7 mm

3. Crossbites: Buccal crossbite of upper 2nd molars

4. Facial: Protrusive lip profile

5. Radiographic\Cephalometric:

- Skeletal: Class I (*SNA 80°, SNB 77°, ANB 3°*), high mandibular plane angle (*SN-MP 39°*)
- Dental: Increased axial inclination of the lower incisors (*IMPA 110°*)

6. Radiographic\Panoramic: Low sinus floor and upper midline deviated 2mmm to left

Specific Objectives of Treatment

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: Retract the incisors
- Vertical: Intrude the molars
- Intermolar Width: Maintain
- Intercanine Width: Decrease
- Buccolingual Inclination: Correct bilateral buccal cross bite of 2nd molars

Mandibular Dentition

- A - P: Retract the incisors
- Vertical: Maintain
- Inter-molar Width: Maintain
- Inter-canine Width: Maintain
- Buccolingual Inclination: Maintain

Facial esthetics: Retract both lips

Treatment Plan

Extract all four 1st premolars along with the upper right 2nd molar. Use high torque brackets on the upper anterior teeth and standard torque brackets on the lower teeth. Bond both arches with an .022" slot Damon Q bracket system (*Ormco*). Place posterior bite turbos on both lower 1st molars in combination with cross elastics (*3.5 oz*) to correct the buccal cross bite.[1] Two miniscrews in the infrazygomatic crests may be needed to retract the upper dentition to resolve the maxillary protrusion. Apply light up & down elastics and detail the final occlusion. Retain the corrected dentition in the anterior mandibular segment with a fixed retainer. Use clear overlay retainers in both arches.

Appliances and Treatment Procedures

All four 1st premolars, the upper right second molar and the lower left third molar were extracted before treatment. A .022" slot Damon Q bracket system (*Ormco*) was used. High torque brackets were bonded on the upper dentition. The initial upper archwire was .014 CuNiTi fitted with two sectional protective sleeves between the canines and second premolars. Standard torque brackets were bonded on the lower dentition with a .014" CuNiTi archwire

and similar protective sleeves. To assist with the buccal crossbite correction of tooth #15, a lingual button was bonded on tooth #18 for cross elastics (*Chipmunk 1/8" 3.5oz*), and occlusal bite turbos were place on the lower first molars to temporarily open the vertical dimension of occlusion (*VDO*). In the 3rd month, an .018" CuNiTi arch wire was placed and drop-in hooks were fitted in the vertical slot of the upper canines to secure class II elastics (*Parrot 5/16" 2oz*). One month later, when the buccal crossbite correction of #15 had been achieved, the lower bite turbos were removed. A rectangular lower .014" x.025" CuNiTi wire was engaged to achieve initial root torque. Two buttons were bonded on the palatal side of teeth #1 and 4 for the closure of the extraction spaces with sectional power chains. In the 7th month, both upper and lower arch wires were replaced by .017"x.025" TMA wires. Fig. 8 SS ligatures were tied to maintain the firm contacts of the anterior teeth. Drop-in hooks were fitted in the vertical slot of the lower canines to anchor power chains to complete closure of the extraction spaces.

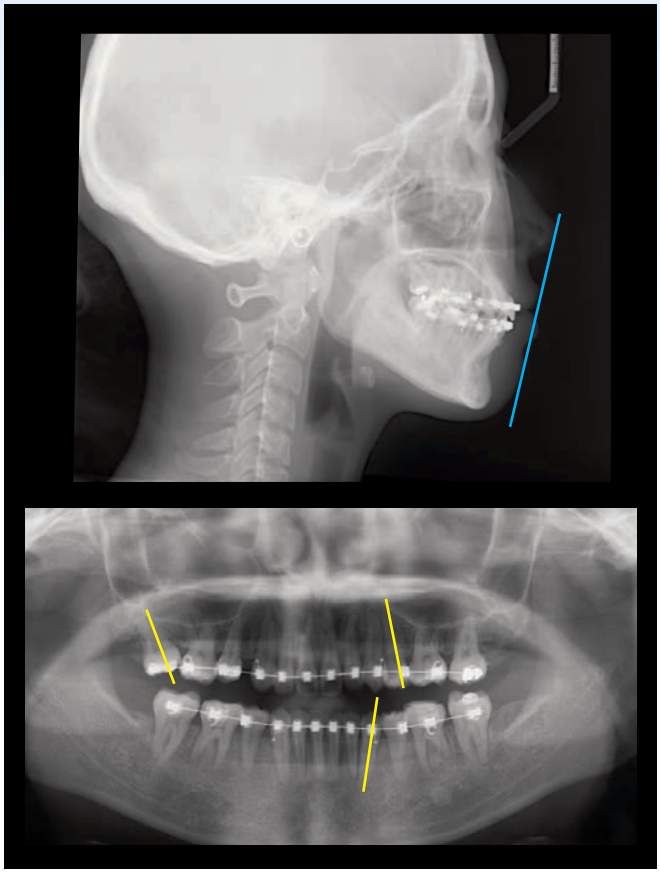


Fig. 7:

Progress cephalometric radiograph shows improvement in the profile and the panoramic radiograph showed the inadequate root angulation for teeth #1, 13 and 22.

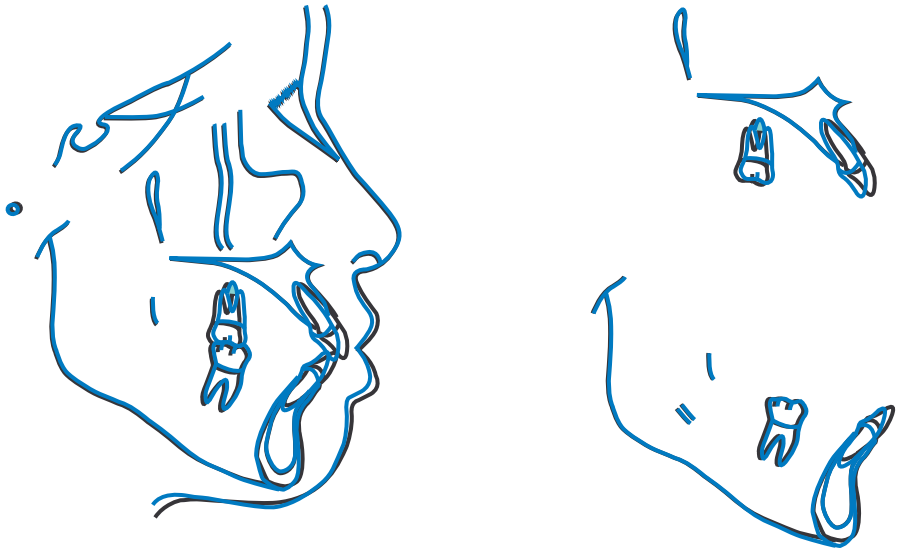


Fig. 8:

Superimposed tracings show the change in treatment progress. All anterior teeth were retracted and lip protrusion was corrected with minimal loss of anchorage.

One month later, a lower .016"x.025" stainless steel wire was placed with a reverse curve of Spee. In the 10th month, L-type elastics (*Bear 1/4" 4.5oz*) were applied from the upper canines to lower molars on the right side to detail the occlusion. The upper arch wire was replaced with a .017"x. 025" TMA wire. In the 13th month of active treatment, progress records were collected. The dental casts and radiographs were assessed using the Cast Radiograph Evaluation (*formally the Objective Grading System*) established by the American Board of Orthodontics to help candidates determine if their met board standards (*Figs. 18-22*). The specifics of this treatment progress analysis and the treatment changes that were indicated will be discussed later in this report.

Fig. 9: Post-treatment facial photographs

Fig. 10: Post-treatment intraoral photographs

Fig. 11: Post-treatment study models

According to the deviations from the CRE ideal (*score 52 as detailed below*), the subsequent treatment plan was revised and discussed with the patient. A .019" x.025" stainless steel wire was placed on the upper arch. One month later, the lingual buttons were bonded on teeth #19, 20 & 30 and cross elastics (*Moose 5/16" 6oz*) were attached from the buttons to the upper canines. In the 18th month, the brackets on teeth #2, 13, 18 and 20 were repositioned and more flexible CuNiTi arch wires were engaged into the precisely positioned adjustments. Two months later, the brackets on teeth #2, 7-10, 19, 23-26 and 30 were repositioned. In the 21st month, a good dental alignment had been achieved, but unesthetic anterior interproximal contacts with V-shaped spaces were noted. From the occlusal view, the palatal contact of the proximal surfaces resulted in facial slits for food debris and stain. To eliminate the black triangles and inadequate crevices between the anterior teeth, interproximal enamel reduction was performed (*Figs. 24-26*). In the final stages of the treatment, subtle adjustments were made with the first and third order bends in the .017"x.025" TMA arch wires. To improve the posterior occlusion, the end of the maxillary arch wire was cut distal to the 2nd premolars and triangular elastics (*Moose 5/16" 6oz*) were applied (*Fig. 28*). Once optimal interdigitation and intermaxillary contacts were achieved, all fixed appliances were removed and retainers were delivered.

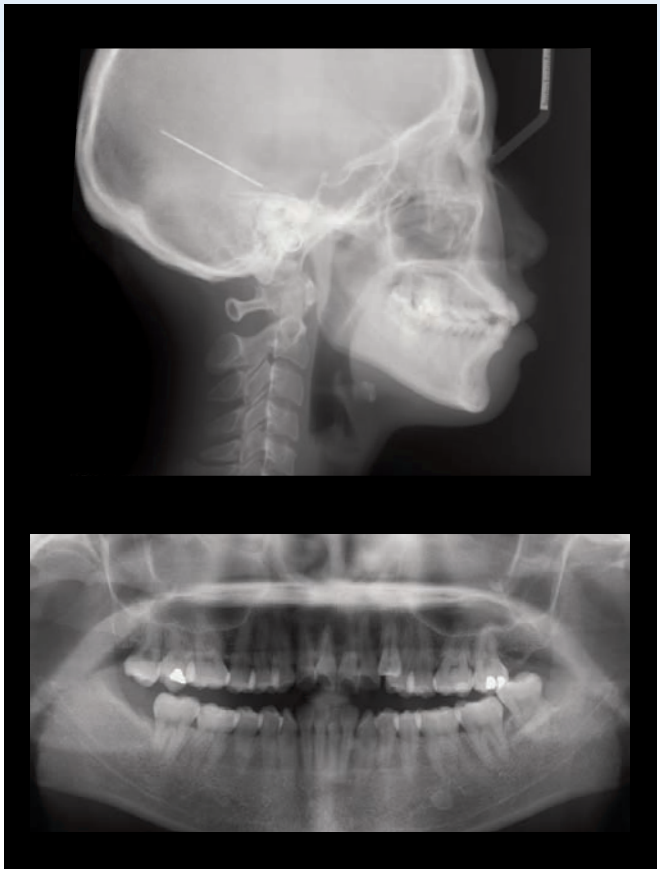


Fig. 12:

Pretreatment panoramic and cephalometric radiographs

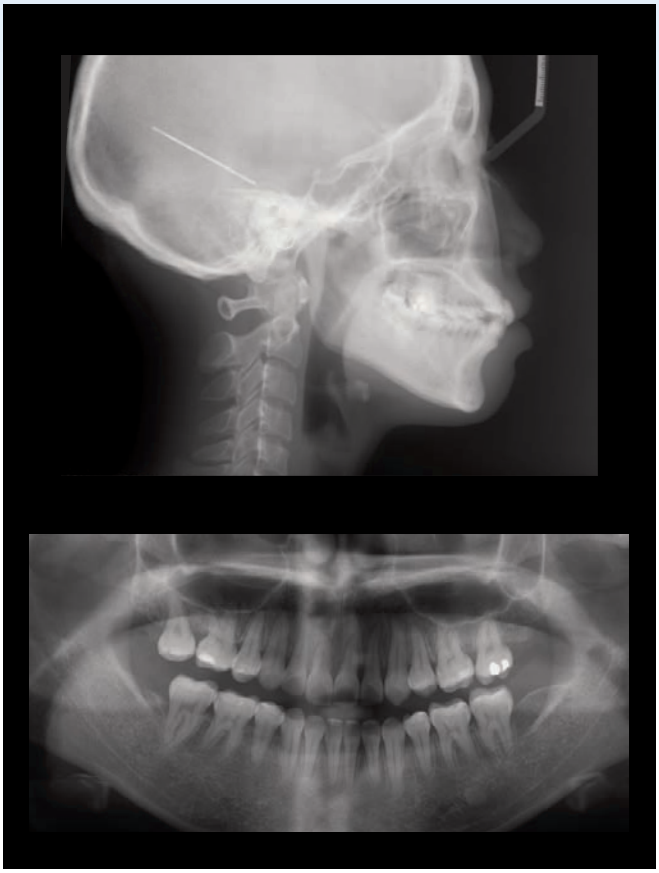


Fig. 13:

Post-treatment panoramic and cephalometric radiographs

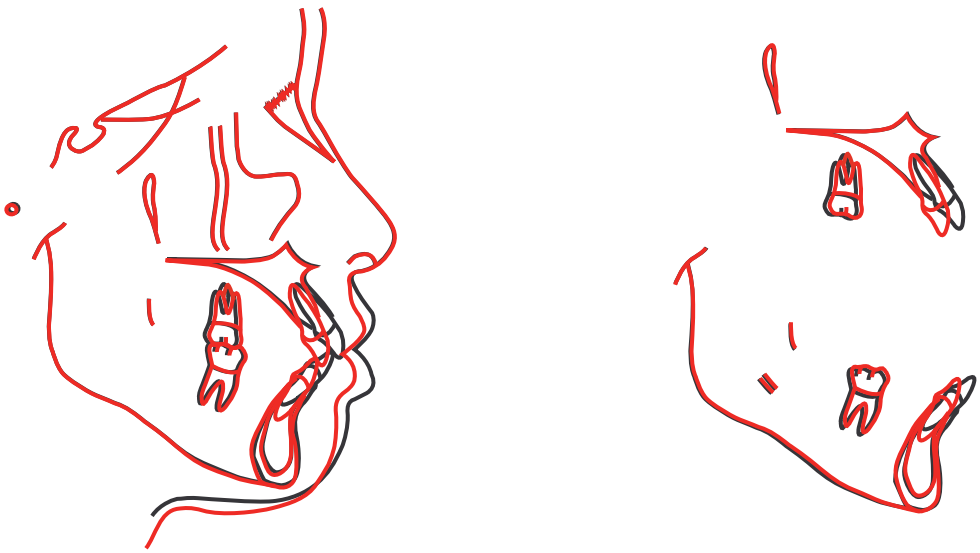


Fig. 14:

Superimposed tracings show all incisors are retracted and the lower incisors are intruded. Despite the anchorage drain for space closure and incisor retraction, the molars showed minimal mesial movement and maintained a class I relationship. The profile was markedly improved relative to the E-line.

Fig. 15: Pretreatment presentation of severely crowded anterior teeth with a blocked out maxillary left canine.

Fig. 16: The occlusal discrepancy involves buccal cross bite of teeth #2,17 and 18, and an irregular overjet of the anterior teeth.

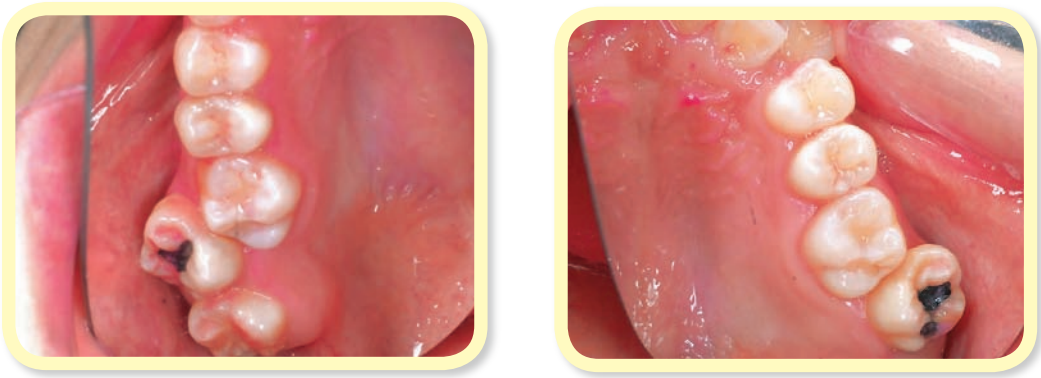


Fig. 17:

Both maxillary second molars deteriorated occlusal restorations and are in buccal crossbite, but the upper right third molar has adequate occlusal anatomy to substitute for a second molar.

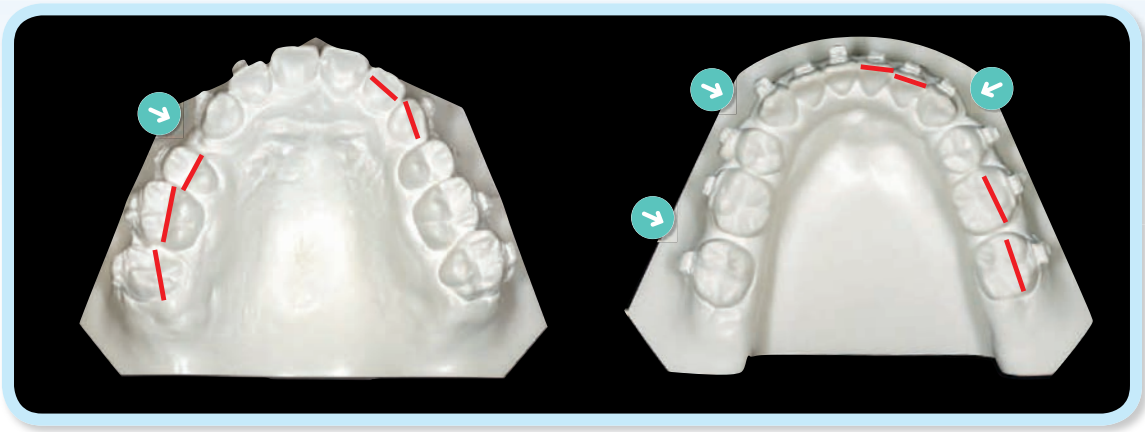


Fig. 18:

Progress Casts: occlusal views of the progress casts has red lines to demonstrate alignment and rotation discrepancies and interproximal contact problems are marked by arrows.

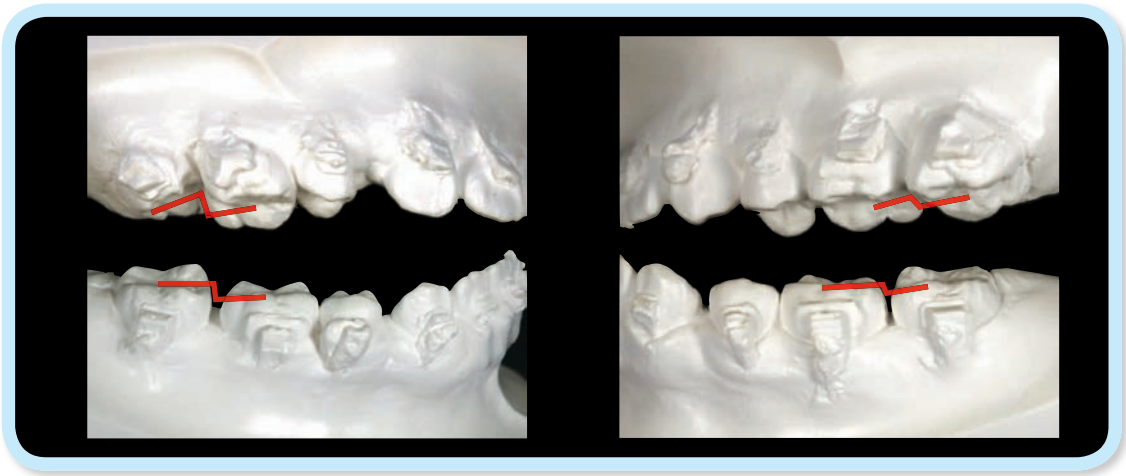


Fig. 19: Progress casts: to correct the marginal ridge discrepancies shown by red lines, brackets had to be repositioned.

Fig. 20:

Progress casts: the ABO step gauge was used to assess the buccolingual inclination of premolar and molars. Tooth #20 was buccally flared due to the pulling force of the cross elastics.

Fig. 21: Progress casts: 15 points were scored for overjet, which was the largest discrepancy in dental alignment.

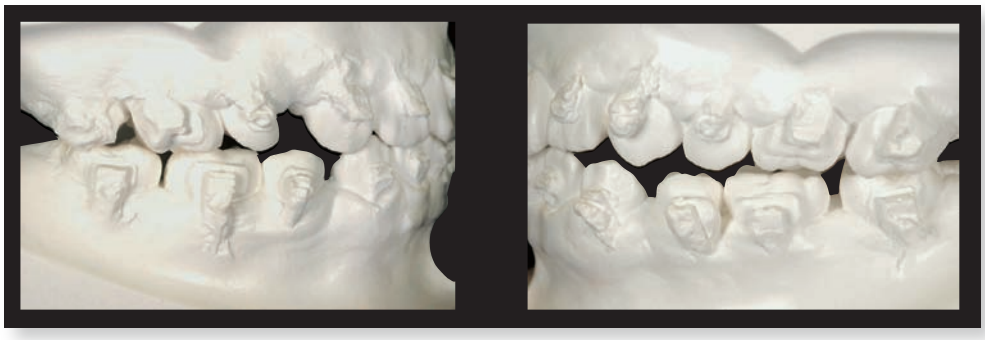


Fig. 22: Progress casts: Occlusal contacts and alignment relationship showed many discrepancies in the 13th month.

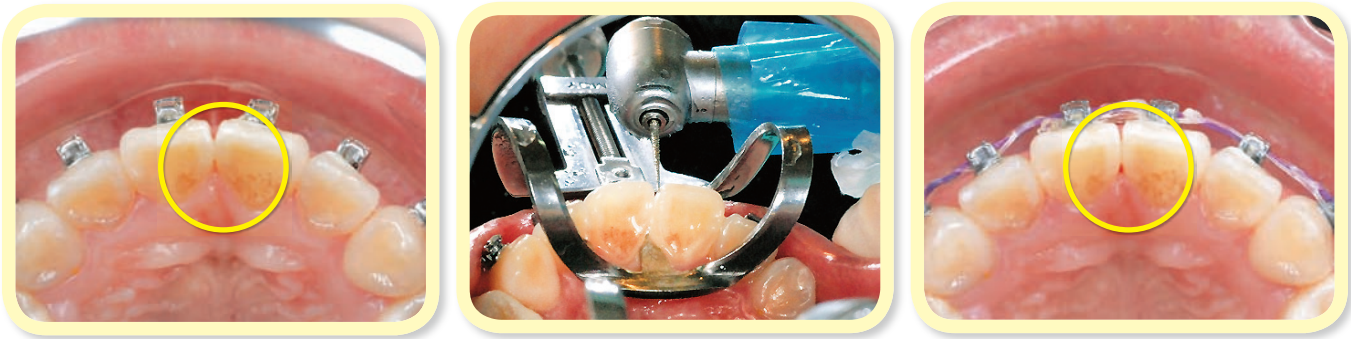


Fig. 23: The V-shaped spaces from the occlusal view were corrected with an interproximal contact reduction procedure.

Fig. 24: Black triangles were eliminated using a selective enamel procedure in the interproximal areas.

Fig. 25:

The irregular palatal marginal ridges were reduced with a green stone in a low speed handpiece to help eliminate V-shaped space and allow for a complete reduction of incisal overjet.

Fig. 26:

The adjusted surfaces were polished with separating strips.

Fig. 27:

Power chains were applied to consolidate the residual interproximal spaces.

CEPHALOMETRIC				
SKELETAL ANALYSIS				
	PRE-Tx	Tx-Progress	POST-Tx	DIFF. (*pre-post*)
SNA°	80°	79°	79°	1°
SNB°	77°	76°	76°	1°
ANB°	3°	3°	3°	0°
SN-MP°	39°	39°	39°	0°
FMA°	32°	32°	32°	0°
DENTAL ANALYSIS				
U1 TO NA mm	10 mm	7 mm	5 mm	5 mm
U1 TO SN°	107°	103°	98°	9°
L1 TO NB mm	12 mm	9 mm	6 mm	6 mm
L1 TO MP°	111°		105°	6°
FACIAL ANALYSIS				
E-LINE UL	0 mm	-1 mm	-1.5 mm	1.5 mm
E-LINE LL	5 mm	3 mm	0 mm	5 mm

Table. 1: Cephalometric summary

Treatment Progress

Date of Records was 12-03-2011 (Figs. 4-8). All treatment goals were reevaluated and the following revisions were made:

Maxillary Dentition

- Intermolar Width: Increase

Mandibular Dentition

- Inter-molar Width: Increase
- Inter-canine Width: Increase

Treatment Needs For An Optimal Finish

To-do list based on the progress cast radiograph evaluation (CRE) score of 52:

1. Detailing bends to correct rotations

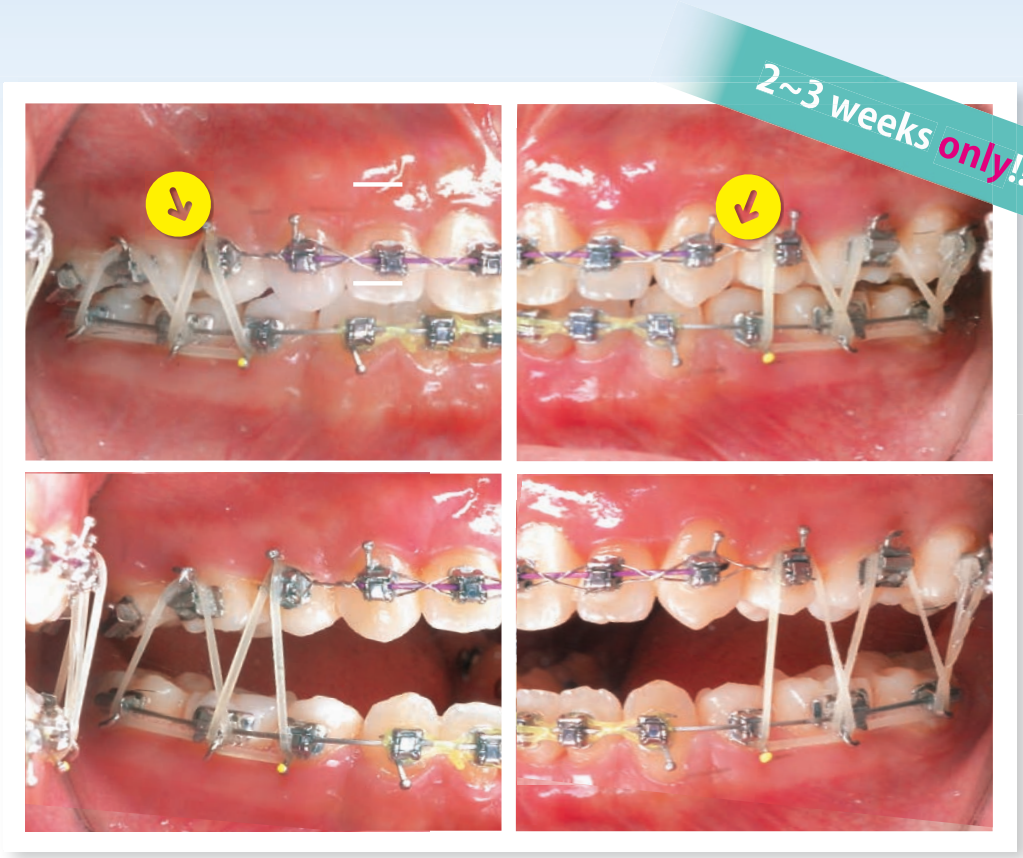


Fig. 28:

To detail the occlusion, the upper posterior archwire was cut distal to the premolars, and vertical elastics were used to seat the maxillary teeth on the mandibular dentition that was stabilized with an archwire..

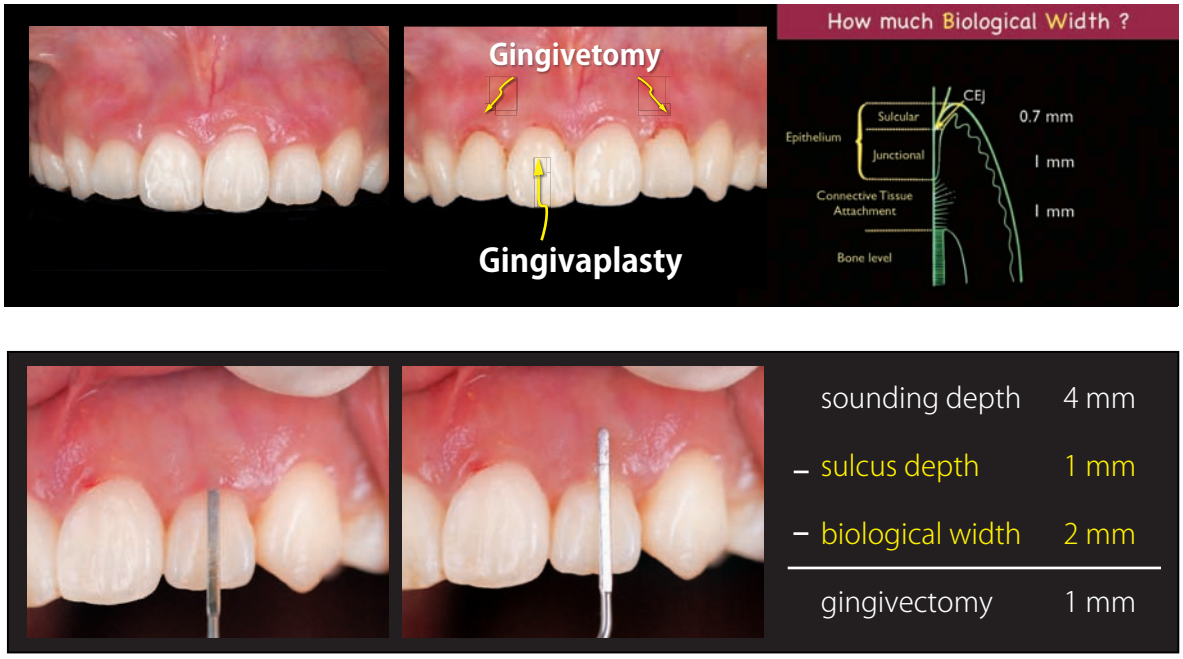


Fig. 29:

Gingivoplasty and gingivectomy is limited to the sounded depth minus 3mm to preserve the biologic width of the periodontium..

Fig. 30: Tooth #2 (original the 3rd molar) shows distal in rotation and #27 exhibits a mesial-in rotation.

Fig. 31:

Marginal ridge discrepancies are evident between the upper premolars and first molars.

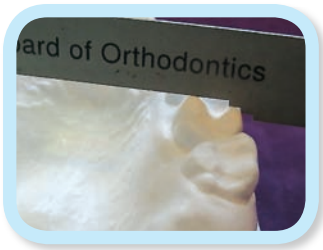


Fig. 32: The buccolingual inclination is measured for tooth #14.

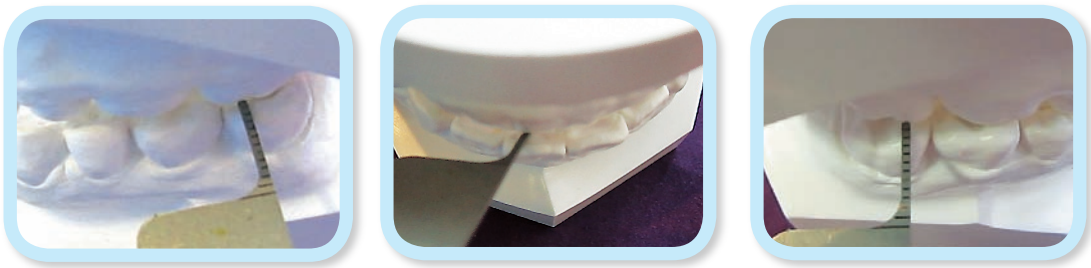


Fig. 33: Excessive overjet was observed for teeth #2, 8 and 15.

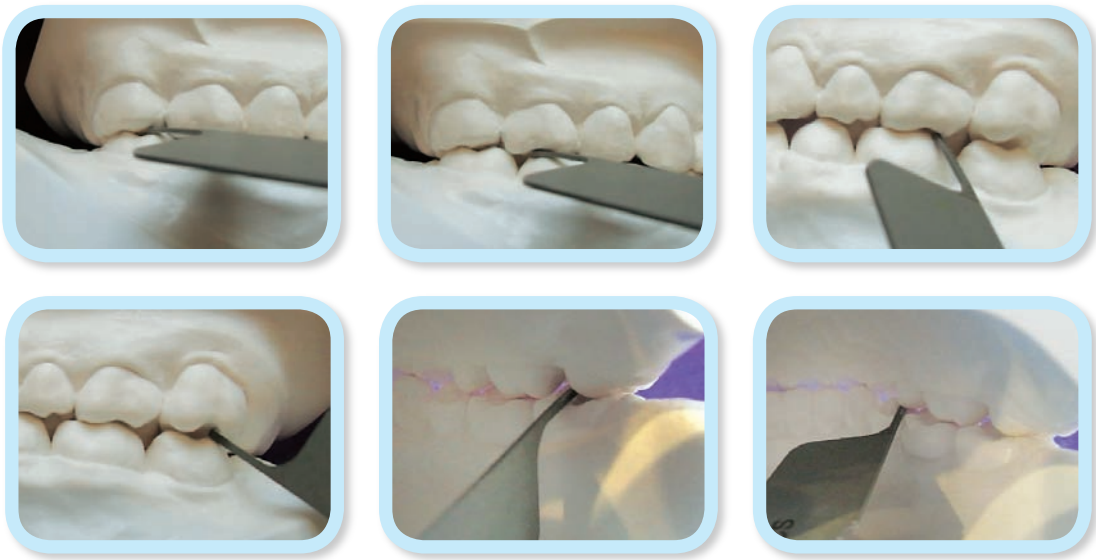


Fig. 34: Tooth contacts are evaluated on the finish casts.

Fig. 35:

The upper right third molar was protracted with simultaneous force application on the buccal and palatal surfaces.

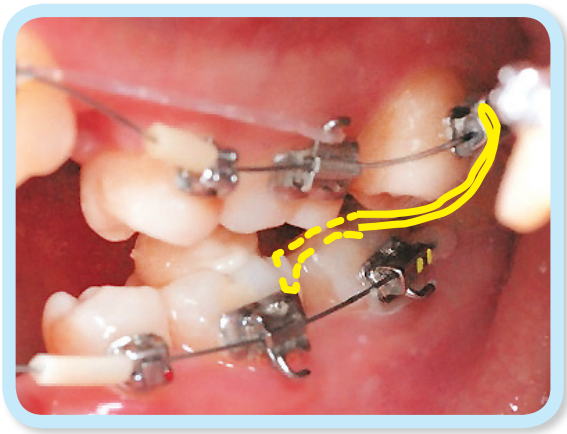


Fig. 36:

Bite turbos opened the occlusion so that cross elastics can efficiently correct the buccal crossbite.

2. Reposition the brackets on teeth #1, 4, 10, 12, 18, 19 and 31 to correct marginal ridge discrepancies.

3. Complete the closure of extraction spaces with sliding mechanics.

4. Constrict the upper arch to correct the buccal overjet.

5. Use miniscrews in the infrazygomatic crests bilaterally to correct the midline discrepancy and lip protrusion.

6. Arch coordination to improve the occlusal relationship and contacts.

Progress Concerns and Summary

Buccal cross bite, crowding and protrusion were improved, and axial inclination of all incisors was reduced. However, there were many bonding errors leading to alignment irregularities. Bracket repositioning will be performed after closing the extraction spaces. Miniscrews in the infrazygomatic crests will be proposed to further correct the midline off and maxillary protrusion. To-do list aims to reduce the CRE score from 52 down to <20. Estimated treatment time is 9 more months.

Fig. 37:

Different appearances are noted for a protracted right maxillary third molar compared to a natural left second molar after cross bite correction.

Results Achieved

Date of Records: 01-04-2013 (Figs. 9-14), Age: 27-00, Tx Time: 26 months

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- Alignment: #2 rotated distal side out
- Anchorage: Maintained
- Incisor Control: Uprighted (*decreased axial inclination*)
- A.P.: Retracted
- Vertical: Maintained
- Intermolar Width: Increased
- Intercanine Width: Decreased
- Marginal Ridges: discrepancy on #3-4, 13-14
- Buccolingual flaring of #14

Fig. 38: A good profile and a pleasing smile were achieved.

Mandibular Dentition

- Alignment: #27 rotated mesial side in
- Anchorage: Maintained
- Incisor Control: Uprighted
- A.P.: Retracted
- Vertical: Maintained
- Inter-molar Width: Maintained
- Inter-canine Width: Increased
- Buccolingual Inclination: Acceptable

Facial esthetics:

- Lip profile improved, especially the lower lip.

Superimposition: Both the maxillary and mandibular dentoalveolar processes were retracted slightly. Both upper and lower incisors were retracted and their inclination was improved. A slight loss of anchorage was found in both arches due to the use of intermaxillary elastics, but it was well controlled. Although extensive Class II elastics were used, no extrusion of mandibular posterior teeth was noted, probably due to the intrusive vector of the posterior bite turbos. No mandibular growth was observed. Class I molar relationship was maintained. Overjet and overbite were ideal. The protrusive lip was retracted to a straight and balanced profile (*Figs. 12-14*).

Retention

A lower fixed retainer was bonded from teeth #20-29. 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. Instructions were provided for routine home care and maintenance of the retainers.

Final Evaluation of Treatment

The major discrepancies in the anterior teeth were corrected, resulting in normal overjet and overbite (*Fig. 17*). All extraction spaces were closed. The upper dental midline was shifted 2mm to the right to correspond with the facial midline. Blocked-out canines were well aligned, and the gingival texture was healthy. The ABO Cast-Radiograph Evaluation score was 16 points, as documented on the form that appears later in this report. The score is an excellent result which is well within the limit of 30 for this series of ABO case reports. The following deviations from ideal were noted: [2]

- The upper left third molar, moved into the second molar position, was rotated distal in, and the lower right canine was rotated mesial in (*Fig. 30*).
- Marginal ridge discrepancies were noted between the maxillary premolars and molars bilaterally (*Fig. 31*).
- Buccolingual inclination was evident in the upper left first molar (*Fig. 32*).
- Excessive buccal overjet was observed for the upper right second molar, left second molar and right central incisor (*Fig. 33*).
- Occlusal contacts were absent for five occlusal stops in the buccal segments, most of which were associated with 2nd molar alignment (*Figs. 34*).
- Root angulation problems were observed for the upper right premolar and second molar, as well as for the lower left second incisor (*Fig. 13*).

Discussion

The major problems in this case were the buccal crossbite and the bimaxillary protrusion. The Discrepancy Index (*DI*) was 29.[3,4] There were two treatment options to resolve the protruded profile. One was non-extraction with extra-alveolar miniscrews to retract both dental arches,[5] but the patient's long face and high mandible plane angle complicates that approach. Bimaxillary protrusion and crowding, in a patient with increased VDO, respond more positively to extracting all four 1st premolars.[6] Bilateral buccal crossbite of the second molars was solved by using different approaches (*Figs. 35-37*). On the left side, the occlusal bite turbos were bonded on the first molars to create intermaxillary space for cross elastics (*3.5 oz, 1/8" Chipmunk*)(*Fig. 36*). On the right side, the large restoration in the second molar favored extraction and third molar protraction to close the space (*Figs 35 and 37*). Because of dental anatomical variations, achieving root parallelism was more challenging than anticipated. Analyzing progress records (*Figs. 5-7*) was very helpful in identifying and correcting the bracket bonding errors (*Fig. 13*).[7]

After closing the spaces, the patient was very

pleased with the improvement in her facial profile. It was not necessary to use extra-alveolar OBSs, which was the patient's preference. The Class II molar relationship and midline deviation were solved using unilateral Class II elastics. In retrospect, an OBS in the left infrazygomatic crest would have expedited the treatment, enhanced the midline correction, and easily achieved a solid Class I occlusion. It would have been wise to propose the use OBS prospectively. Patients tend to be less receptive to this option if they were not expecting it.

In the finishing stage of the treatment, V-shaped interproximal spaces were spotted in the occlusal view of the upper incisors. Such anatomical contours create a false illusion of incomplete space closure, despite contact of the lingual marginal ridges. This morphological variation of incisors is a common Asian, particularly among Chinese. The restorative solution for this problem is to separate the teeth, reduce the lingual marginal ridges and smooth the lingual line angles to taper the interproximal surface to the lingual. After the reshaping procedure, the residual spaces are closed. At the same appointment, the black triangles between the lower incisors were corrected by progressive enamel stripping toward the incisal edge (*Figs. 23-27*).[8]

When the fixed appliances were removed, a discrepancy in the incisal gingival display was noted. The maxillary incisors had inadequate crown exposure relative to adjacent teeth. The clinical management for this problem is illustrated in Fig. 29. Under local anesthesia, gingival sounding was performed by probing, from the free gingival margin to the alveolar bone crest. The sounding depth on the labial surface for both upper lateral incisors was 4 mm, which exceeds the 3mm minimum for adequate biologic width of healthy gingiva.[9-11] A diode laser was used to perform a 1mm gingivectomy on the labial surface of both lateral incisors. This minor surgical procedure dramatically improved the "*pink and white*" esthetics, as scored in the form appearing at the end of this case report.[12,13]

The final alignment was evaluated with the ABO cast radiograph evaluation (*CRE*), and the score was 16 points, which is an excellent finish for a difficult malocclusion (*DI = 29*). The major finishing discrepancy was occlusal contacts (*5 points*); all other discrepancies were 3 points or less. Most of the finishing problems (*9 points out of 16*) related to alignment of teeth in the maxillary second molar positions. These problems related to lack of natural wear facets, unusual dental anatomy and the difficulty of achieving precise mechanics with adjustment at the end of the archwire. At the last appointment before debonding, the maxillary arch wire was sectioned distal to the second premolars to accommodate vertical elastics for final detailing after the method of Steffen[14] (*Fig. 28*). Overall, the patient was well satisfied with the treatment.[15]

Conclusion

The patient's chief complaints of protrusive lips and a blocked-out (*high*) maxillary canine were addressed to her satisfaction. Outcomes assessment demonstrated that facial and dental esthetics were excellent. Analysis of progress records, to fine tune

the finishing mechanics, was an important step in achieving near ideal dental occlusion and functional alignment of the dentition with no lip strain. Two methods for correcting buccal crossbite of maxillary molars were utilized, and both were successful except for some limitations is achieving ideal intermaxillary occlusal contacts. In retrospect, the use of infrazygomatic miniscrews early in treatment probably would have simplified the mechanics and shortened the treatment time. It is important to discuss that option prospectively with the patient.

References

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Edward H. Angle Society

Patient YAO-CHUN CHUANG

CEPHALOMETRIC SUMMARY

Area	Measurement	A^1	A^2 (progress)	B	Difference A^1 - B
Maxilla to Cranial Base	SNA	80	79	79	1
Mandible to Cranial Base	SNB SN-Go-Gn FMA	77 39 32	76 39 32	76 39 32	1 0 0
Maxillo-Mandibular	ANB	3	3	3	0
Maxillary Dentition	1 to NA (mm) 1 to SN 6-6 (mm)(casts)	10 mm 107 43 mm	7 mm 103 48 mm	5 mm 98 45.5 mm	5 9 2.5
Mandibular Dentition	1 to NB (mm) 1 to Go-Gn 6-6 (mm)(casts) 3-3 (mm)(casts)	12 mm 110 39 mm 27 mm	9 mm 103 40 mm 28 mm	6 mm 98 39.5 mm 28 mm	6 12 0.5 1
Soft Tissue	Esthetic Plane	U: 0 mm L: 5 mm	U: -1 mm L: 3 mm	U: -1.5 mm L: 0 mm	1.5 5

A^1 Pretreatment records
A^2 Interim or progress records if indicated
B Posttreatment records

***NOTE: Difference between A1 and B.** It is not required for Affiliates to use negative or positive signs to indicate this value. Show only the number difference between the two values. **Note, additional measurements may be used for evaluation. Please place these on additional sheet.**

Discrepancy Index Worksheet

EXAM YEAR 2011
AO ID# CHRIS CHANG

Total DI Score 29

OVERJET

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

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

Total = 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 = 7

OCCLUSION

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

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 4

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° **39⁰** = 2 pts.

Each degree > 38° 1 x 2 pts. = 2

≤ 26° = 1 pt.

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

1 to MP ≥ 99° **110⁰** = 1 pt.

Each degree > 99° x 1 pt. = 11

Total = 16

OTHER (See Instructions)

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

Identify:

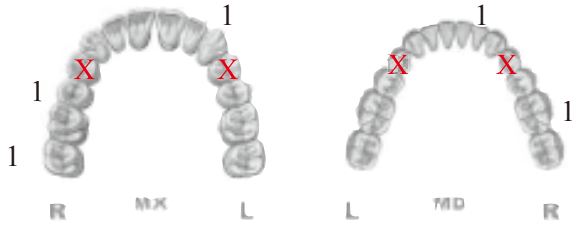
Total = 0

Cast-Radiograph Evaluation

Total CRE Score (Mid-Tx) 52

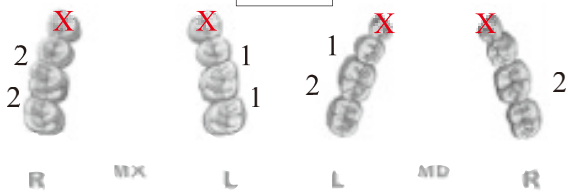
Alignment/Rotations

5



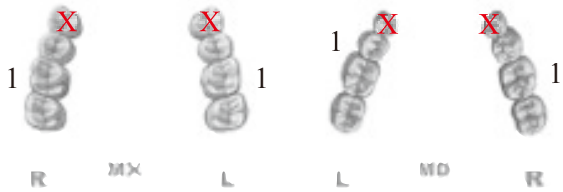
Marginal Ridges

9



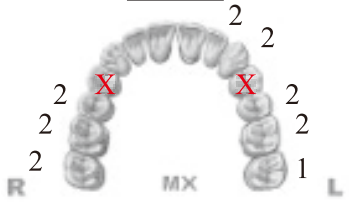
Buccolingual Inclination

4



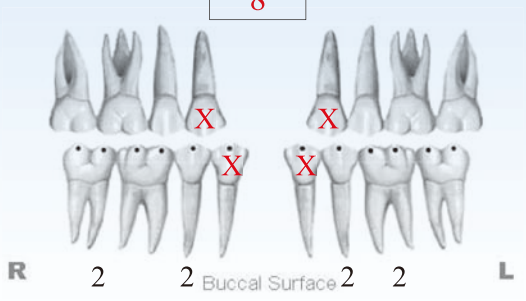
Overjet

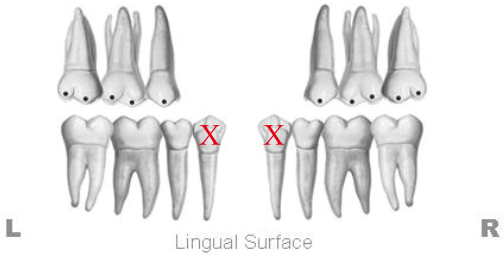
15



Occlusal Contacts

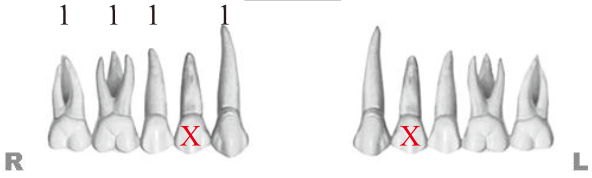
8





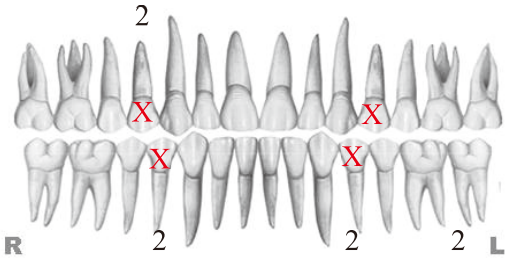
Occlusal Relationships

0



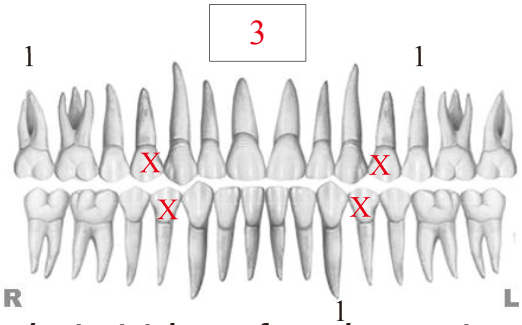
Interproximal Contacts

8



Root Angulation

3



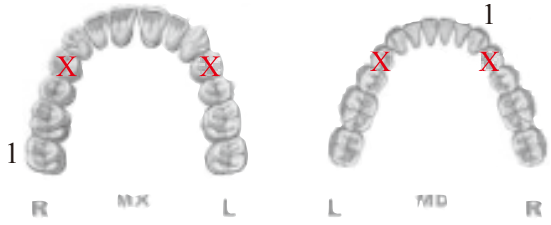
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

Cast-Radiograph Evaluation

Total CRE Score (Final Result) 20

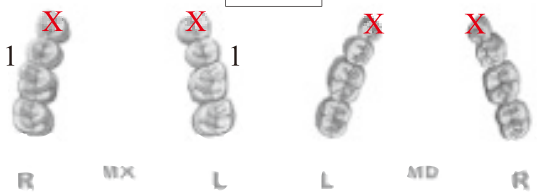
Alignment/Rotations

2



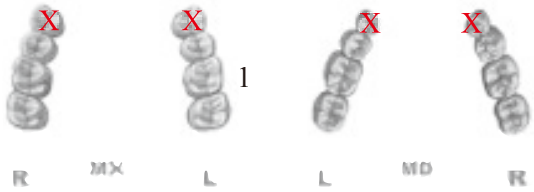
Marginal Ridges

2



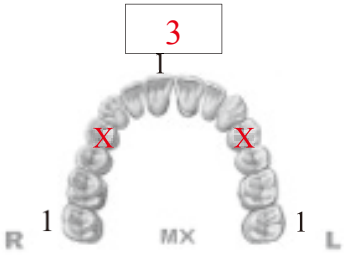
Buccolingual Inclination

1



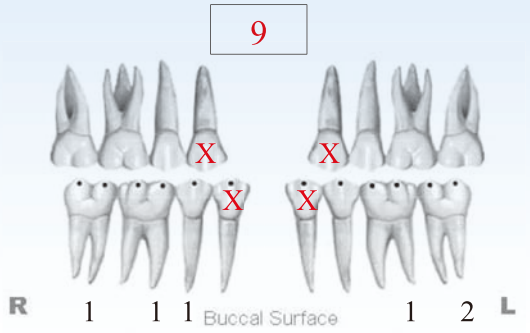
Overjet

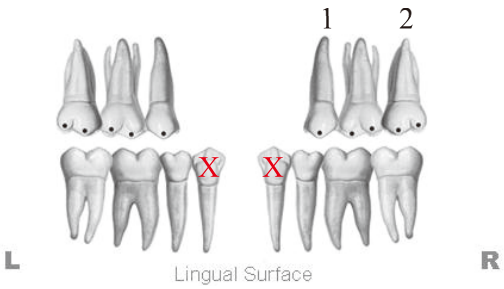
3



Occlusal Contacts

9



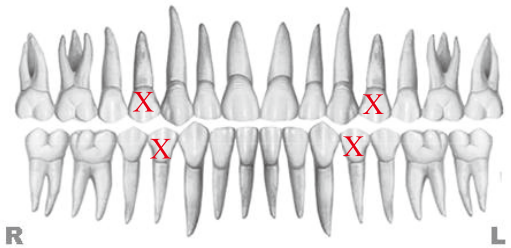


Occlusal Relationships

0

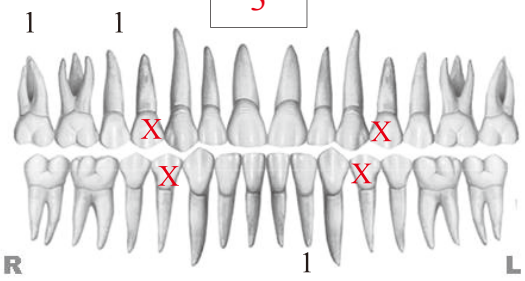
Interproximal Contacts

0



Root Angulation

3



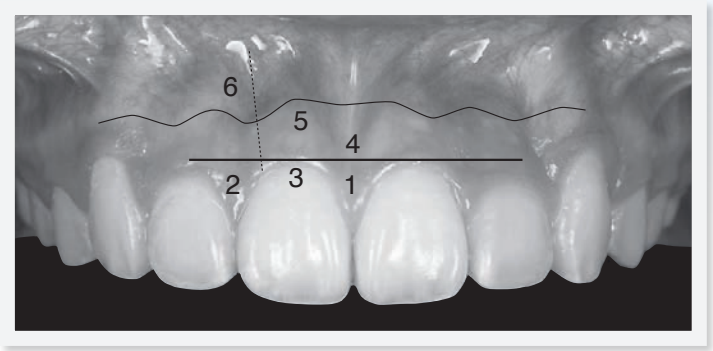
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 3

1. Pink Esthetic Score

Total = 0

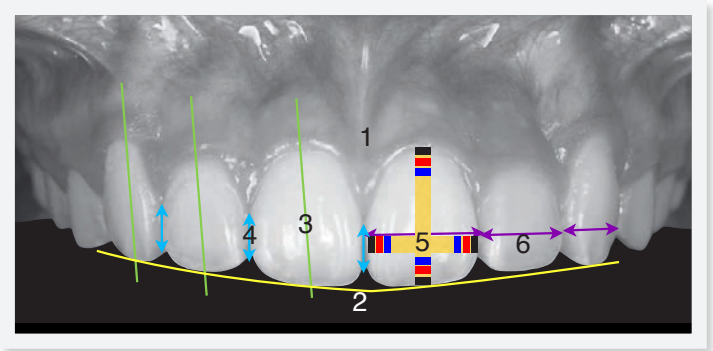


1. Mesial Papilla	0	1	2
2. Distal Papilla	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetics)

Total = 3



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

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

Management of Anterior Cross Bite, Severe Crowding and Loss of a Lower First Molar by Utilizing a Horizontally Impacted Third Molar

History and Etiology

A 23 year old female presented for a consultation about crowding and crossbite of her anterior teeth, as well the impending loss of the lower right first molar (*Figs. 1-3*). She had obtained previous orthodontic consultations but was dissatisfied because none of the treatment plans focused on recovering her lower right impacted third molar (#32) and aligning it in the quadrant to replace the hopeless first molar. There was no other contributing dental or medical history.

The patient had a prominent lower lip, but an otherwise acceptable profile, and the buccal segments were Class I (*or close to it*) bilaterally with anterior crowding and a crossbite. Collectively, these findings are consistent with Lin's[1] pseudo Class III malocclusion which is effectively managed with conservative orthodontics therapy. In addition, Chang[2] has proposed a method for recovering horizontally impacted lower third molars. Utilizing these concepts the patient was treated for 26 months with fixed appliances. The facial profile was improved, the second molar (#31) was moved mesially to replace the missing #30, and #32 was uprighted and moved into the #31 position (*Figs. 4-6*). Radiographic documentation of the pre-treatment condition and post-treatment results are provided in Figs. 7-8, respectively. The cephalometric

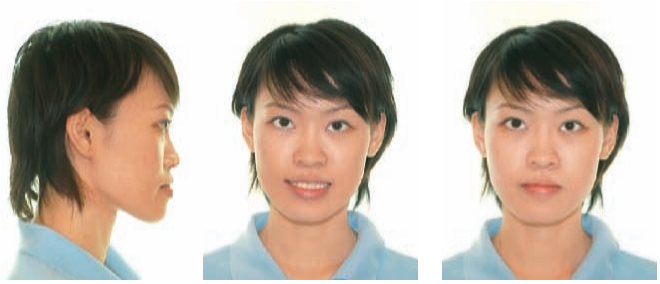


Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment study models (casts)

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

Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models (casts)

values are summarized in Table 1. Figs. 9-10 show cephalometric tracings that superimposed on the anterior cranial base, maxilla, and mandible. The diagnosis, treatment plan and therapeutic approach will be discussed.

Diagnosis

Skeletal:

- Class III tending toward bimaxillary protrusion (*SNA 85°, SNB 85°, ANB 0°*)
- Mandibular plane angle: SN-MP 37°, FMA 30°

Dental:

- Right side: Class I molar and canine in centric occlusion (*Co*)
- Left side: Class III molar (*1-2 mm*) and Class I Canine in Co
- Upper midline shifted 2 mm to the left of the mandibular midline
- Upper incisor to SN plane angle was 120°
- Severe maxillary anterior crowding (*space deficiency of more than 7 mm*).
- Anterior crossbite at #7, 8, 10 with negative overjet of 1-2 mm.
- Lower right first molar (#30) was hopeless and required extraction
- The adjacent second molar (#31) had been

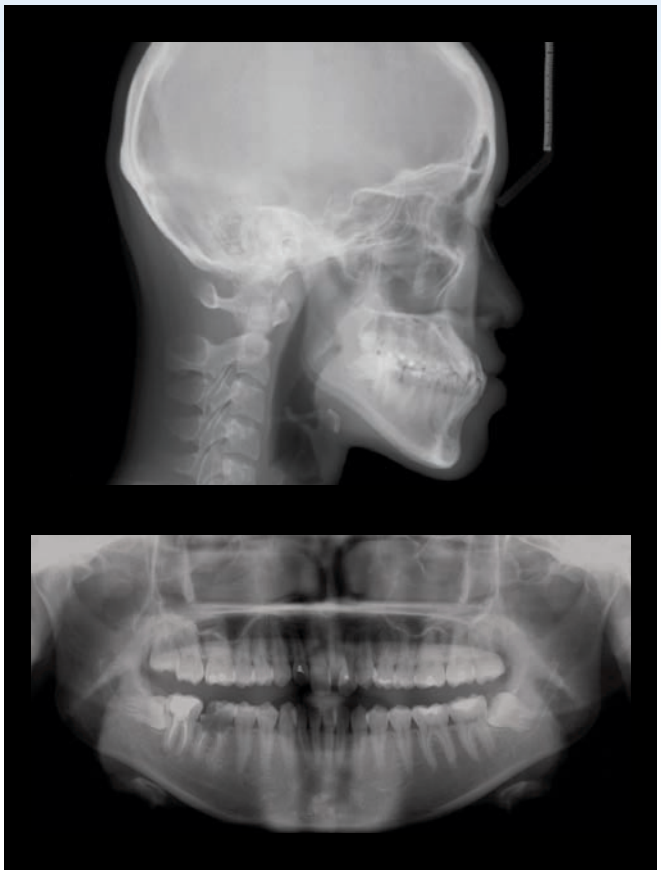


Fig. 7:

Pre-treatment panoramic and cephalometric radiographs show protruded lower lip, severe decay #30, and horizontally impacted #32.

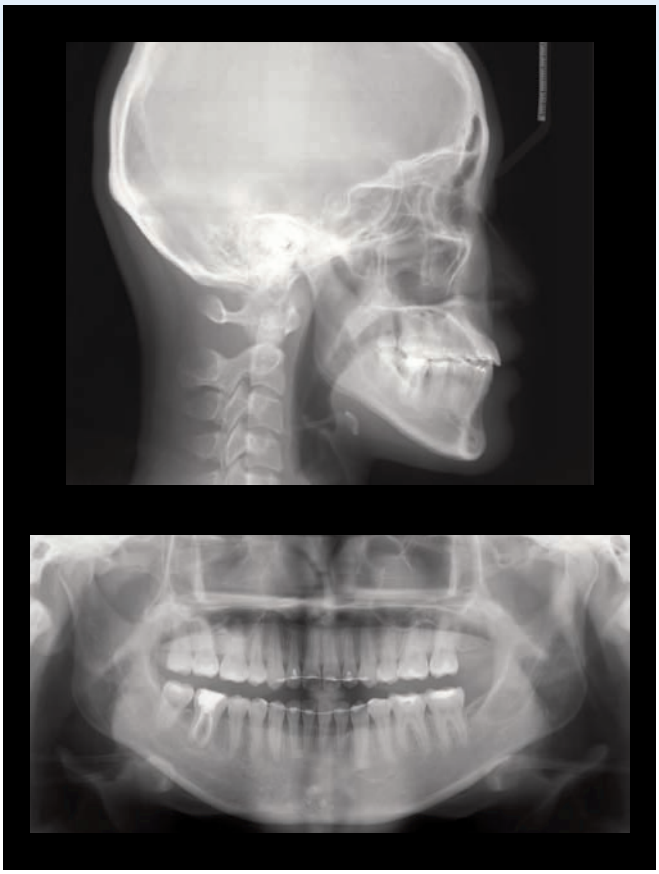
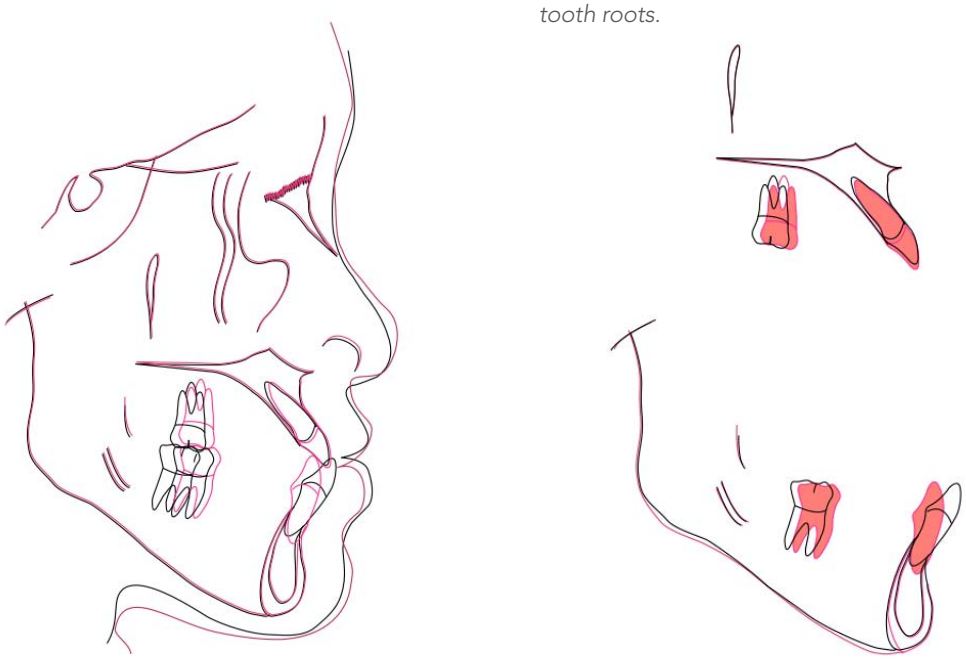


Fig. 8:

Post treatment panoramic and cephalometric radiographs show balanced lip profile and the parallel alignment of all tooth roots.



Figs. 9 &10:

Superimposed cephalometric tracings document lingual tipping of the mandibular incisors and protraction of upper and lower molars.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	85°	84°	1°
SNB°	85°	82°	3°
ANB°	0°	2°	2°
SN-MP°	37°	38°	1°
FMA°	30°	31°	1°
DENTAL ANALYSIS			
U1 TO NA mm	9 mm	7 mm	2 mm
U1 TO SN°	120°	115°	5°
L1 TO NB mm	9 mm	4mm	5 mm
L1 TO MP°	90°	87°	3°
FACIAL ANALYSIS			
E-LINE UL	0mm	-1mm	1 mm
E-LINE LL	2mm	0mm	2 mm

Table. 1: Cephalometric summary

treated endodontically, but the periapical radiolucencies on both roots had not yet resolved

- #17 and 32 were horizontally impacted

Facial:

- Straight (*orthognathic*) profile
- Protrusive lower lip

The ABO Discrepancy Index (*DI*) was 24, as shown in the subsequent worksheet.

Specific Objectives of Treatment

The principal treatment goals were to align the anterior segments, correct the crossbite, and retract the lower incisors. In this regard, the specific treatment objectives are as follows:

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: Maintain incisor position, move molars anteriorly
- Vertical: Maintain.
- Inter-molar Width: Maintain

Mandibular Dentition

- A - P: Retract the lower incisors, anterior movement of the molars
- Vertical: Maintain
- Inter-molar / Inter-canine Width: Maintain.
- Molar substitution for the extracted #30 by moving #31 and 32 mesially

Facial Esthetics

- Retract lower lip

Treatment Plan

The main concerns in developing the appropriate treatment plan were to correct the crowding, crossbite and edentulous space after the extraction of #30. After considering multiple options, the most ideal treatment plan from the patient's perspective was to extract #5, 12, 21 and #30. This asymmetric approach presented some significant challenges: 1. large unilateral molar space to close, 2. uprighting and aligning the horizontally impacted

#32, 3. asymmetric space closure required careful management of anchorage to achieve midline correction.

The treatment plan was: 1. extraction in all four quadrants as previously specified, 2. posterior bite turbos with Class III elastics to correct the anterior crossbite and intermaxillary relationship, 3. protract #31 to close the #30 space, 4. uncover, upright and protract #32 to occlude in the lower right second molar postion.[2]

Appliances And Treatment Progress

Operative dentistry needs, as well as extraction of teeth #5, 14, 21, and 30, were accomplished before starting the orthodontic treatment. At the first treatment appointment, Damon D3MX .022" Brackets (*Ormco*) were bonded on the upper arch and posterior bite turbos were constructed with Fuji II glass ionomer cement on the occlusal surfaces of teeth #18 and 31. The patient was instructed to use a tongue depressor to help correct the anterior cross bite (*Fig. 11*). After three months of treatment, the crowding was almost resolved, and the anterior cross bite was corrected. The posterior bite turbos were removed and the lower arch was bonded with Damon D3MX .022" brackets. High torque brackets were needed for the lower incisors, to compensate for Class III elastics wear, but the special brackets required were not on the market at that time. So standard lower incisor brackets were banded upside down to achieve +6° of torque (*Fig. 12*). The wire sequence in both arches was .014 CuNiTi, .014x.025

Fig. 11:
Tongue depressor and posterior bite turbos were used to correct the anterior cross-bite.

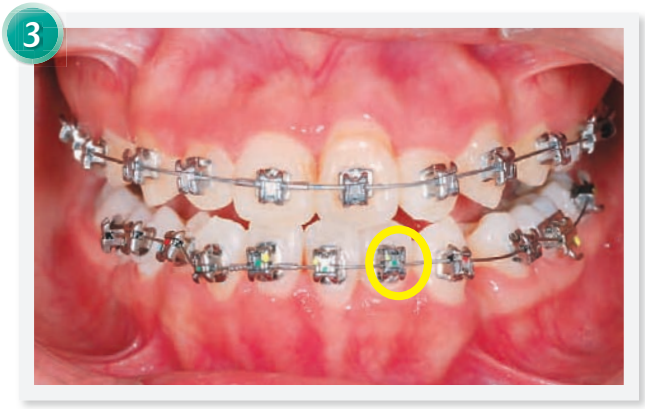


Fig. 12:
Three months into treatment, the posterior bite turbos were removed. The crossbite was resolved but the patient only had contact on #8 and 9, which required a slow adaptation from a soft to a normal diet. Note the orientation of the bracket (circled).

CuNiTi, .017x.025 TMA, .019x.025 SS and then back to .017x.025 TMA for detailing. The extraction space closure with chains of elastics began after the .019x.025 SS arch wires were placed.

After sixteen months of treatment, #31 was protracted to close the space of #30 (*Fig. 13-14*). The third molar (#32) erupted and its axial inclination

Fig. 13:

In the 14th month of treatment, note the severe ridge atrophy in the extraction site of the lower right first molar (#30). The space is being closed by protracting #31.

Fig. 14:

In the 18th month, the #30 space was almost closed and #32 is erupting into the oral cavity.

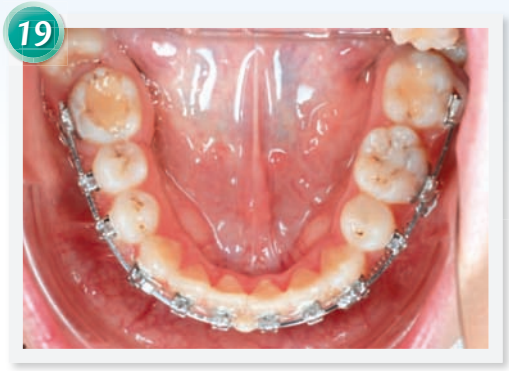


Fig. 15:

In the 19th month, the first molar space was closed; #32 has erupted further and is starting to upright spontaneously.

Fig. 16:

In the 22nd month, an open coil spring was placed between #31 and 32 to complete space closure with the second premolar, and to further upright #32.

improved (*Fig. 15*) sufficiently to be bonded. An open coil spring was used to complete the uprighting of the third molar so it could be aligned in the second molar position (*Fig. 16*).[2] Fig. 17 is a sequence of radiographs documenting the alignment of #32.

At twenty-four months, the maxillary left central incisor (#9) had decreased axial inclination and the root of #10 was tipped lingually. To correct these reciprocal problems, a torquing spring was used for tooth #9, and the bracket on #10 was turned upside down to change the torque from +8° to -8° (*Figs. 18-20*). In the 25th month, a lingual button and cross elastic were used to correct lingual tilting of #32; this is a common problem when uprighting mandibular 3rd molars.[2] After twenty-nine months of active treatment, the appliances were removed and a diode laser was used to increase the crown exposure of all maxillary incisors except #9 (*Fig. 21*).

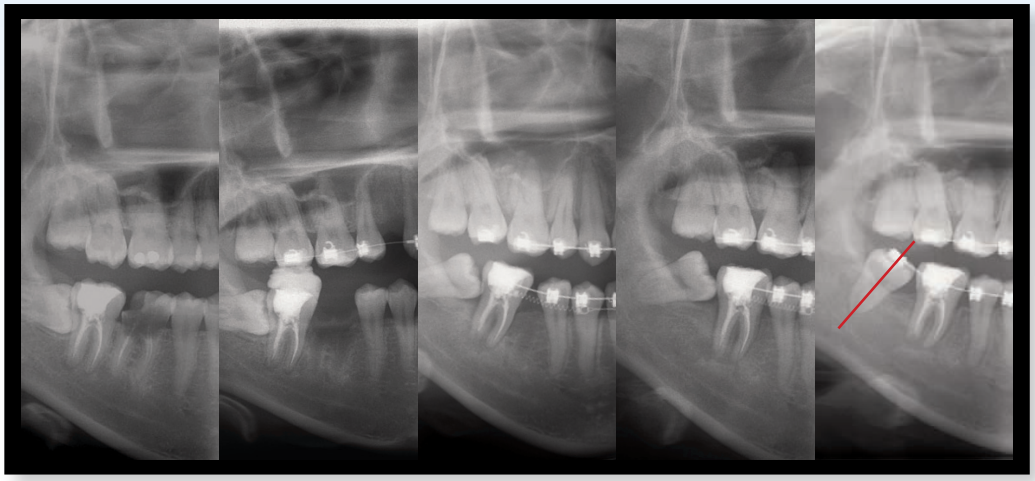


Fig. 17:

Progressive panoramic x-rays show the mesial movement of #32; after 22 months the bracket was bonded on #32 with the slot perpendicular to the long axis of the tooth.

Fig. 18:

The left maxillary central incisor (#9) received a torque spring to increase its axial inclination. Note that the bracket on the adjacent lateral incisor (#10) is bonded upside down.

Fig. 20:

Note the more symmetrical palatal crown exposure as the axial inclinations of teeth #9 and 10 are corrected.

Fig. 19 :

Note the difference in clinical crown exposure between #8 and 9 due to excess buccal root torque of #9. Tooth #10 has excessive lingual root torque.

Fig. 21:

A selective gingivectomy was performed to improve the symmetry of clinical crown lengths for the maxillary incisors.

Results Achieved

Maxilla:

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

Mandible :

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

Maxillary Dentition:

- A - P: Incisors maintained, molars protracted ~2mm
- Vertical: Incisors extruded slightly, molars maintained
- Inter-molar Width: Maintained

Mandibular Dentition:

- A - P: Mandibular incisor tipped lingually
- Vertical: Incisors intruded, molars maintained
- Inter-molar/Inter-canine Width: Maintained.

Facial Esthetics:

- Lower lip has been retracted ~ 2-3 mm, chin is more prominent

Retention

Immediately following removal of the fixed appliances, fixed 3-3 retainers were bonded on all anterior teeth in both arches. In addition, a clear overlay retainer was used for the upper arch. The patient was instructed to wear the overlay retainer full time for the first 6 months and nights only thereafter. Home care and retainer maintenance instructions were provided.

Final Evaluation of Treatment

A well conceived treatment plan is essential for achieving a favorable outcome. The extraction space for a hopeless lower first molar was utilized to resolve crowding. The protraction of the second molar into the first molar space provided the necessary space to upright and align the horizontally impacted third molar. Although the occlusal relationships on the right side were not ideal, the compromised interdigitation was superior to the prosthetic option (*fig. 5*). The patient is very pleased with the treatment results.

The anterior crowding and reverse overjet were treated to an ideal outcome. The patient's facial appearance was improved. Post-treatment photographs (*Fig. 5*) and study casts (*Fig. 6*) reveal a Class I molar and canine relationship on the left side. There was a Class II molar with Class I canine relationship on the right side, due to the asymmetric extraction pattern. The facial and dental midlines were coincident. Tooth #9 still shows excessive clinical crown height, but a minor gingivectomy on other maxillary incisors provided more symmetrical gingival esthetics (*Fig. 19*).

Discussion

According to Lin's study[1] Class III malocclusion is more prevalent among Asians, and a pseudo-Class III relationship is found in about 2.31% of Taiwan's population. Pseudo Class III has a better prognosis than true skeletal Class III malocclusion. Lin[1] classified the pseudo Class III malocclusion according to its etiology. The principal factor for the present patient was decreased perimeter in the anterior region

that resulted in severe crowding (*Figs. 2-3*). Lin's[3] three-rings, diagnostic protocol for Class III patients predicts the potential for conservative treatment to manage an anterior cross-bite. Some pseudo Class III patients may habitually occlude in a cross-bite or end-to-end incisal relationship.[1,3]

This is compatible with Lin's[1,3] diagnostic method, but is not consistent with the traditional concept of Graber[4] and Moyers,[5] both of whom assumed that all pseudo Class III patients had a functional shift.

The most common treatment option for anterior cross-bite with severe crowding is extraction of upper 2nd and lower 1st premolars.[6] Although it complicated the mechanics, the best option for the present patient was extraction of the hopeless #30 instead of #28. Thus, the Class I molar relationship was sacrificed on the right side, but protracting the second and third molars eliminated the need for prosthetics. According to Cristina[7] 66.2% of the mandibular third molars erupt in good positions after 2nd molar extraction, but some horizontally impacted third molars cannot be salvaged. Most unsuccessful eruptions of mandibular third molars are due to excessive mesial tipping or lack of achieving proximal contact.[8] Acceptable third-molar eruption is most difficult to achieve in older patients.[7] Additionally, the size and morphology of 3rd molars is another consideration for 2nd molar substitution, because 3rd molar morphology is highly irregular.[8] For the present patient, the morphology of #32 was adequate when viewed in the panoramic radiograph.

After 19 months of active treatment, the 2nd molar was protracted to provide the necessary space for the 3rd molar to erupt and upright; this scenario is similar to a second molar extraction.[7,8] Chang[2] summarizes some important points to consider when uncovering an impacted 3rd molar:

1. age of the patient,
2. degree of impaction,
3. root form of the tooth, single root and conical root shapes are easier to move;
4. periodontal status of the 3rd molar and adjacent teeth;
5. access for mechanics to upright the 3rd molar.

Chang[9] demonstrates two options for uprighting an impacted 3rd molar: 1. occlusal approach anchored with a TAD, and 2. buccal approach with a bonded bracket and open coil spring.[2] Use of a self-ligation bracket is recommended because it is easier to insert the archwire with an activated open coil spring. The buccal approach was used for the present patient (*Fig. 16*). Following the uprighting of a 3rd molar, a fixed retainer on the buccal side of 2nd and 3rd molars is strongly recommended because space is likely to reopen between the molars. Although a fixed retainer was not used for the right second and third molars in the present case, the correction was well maintained 3 years later (*Fig. 22*). A persistent gingival cleft may occur mesial to a protracted molar (*Fig. 23*). If the periodontium of adjacent teeth is healthy, the cleft is not a problem in posterior areas. However, if the cleft occurs in an esthetic zone, periodontal correction may be indicated.

The IBOI Cast-Radiograph score was 17 points, which is well within the acceptable range for the board style case reports in this series. The major discrepancies were occlusal relationships and contact points. For the present patient, the principal finishing problems were in the interdigitation in the right segment due to asymmetrical extraction

Fig. 23:

Three years after the mandibular first molar space was closed, a gingival cleft (arrow) has persisted where the #30 space was closed. The cleft has not affected the periodontal health of the adjacent teeth.

Fig. 22:

Post treatment photographs taken 3 years after treatment show that the orthodontics result has been stable.

pattern: upper first premolar (#5) and lower first molar (#30).

Conclusion

Lower third molars have the highest incidence of impaction and are a problem for many patients. Although lower third molars are usually extracted, they may be salvaged to replace a missing first or second molar in the same quadrant. Even horizontally impacted third molars can may be recovered and aligned to provide longterm function.[2] Patients are pleased with replacing a non-restorable tooth with one of their own teeth, that would otherwise be extracted.

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9. Chang CH, Roberts WE. Twelve applications of TADs for impacted teeth. Orthodontics Vol. II. Taipei: Yong Chieh; 2012.

Discrepancy Index Worksheet

Total DI Score 24

OVERJET

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

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

Total = 7

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° 1 x 2 pts. = 2

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 2

OTHER (See Instructions)

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

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) =_____

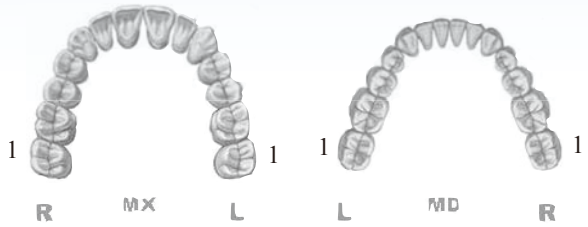
Total = 0

Cast-Radiograph Evaluation

Total CRE Score 17

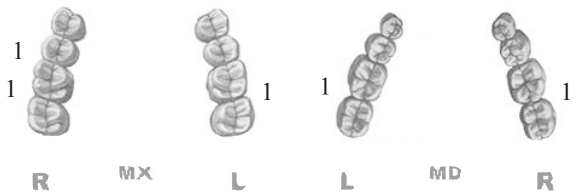
Alignment/Rotations

3



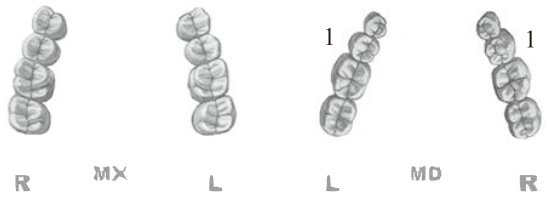
Marginal Ridges

2



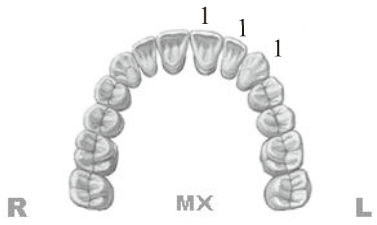
Buccolingual Inclination

1



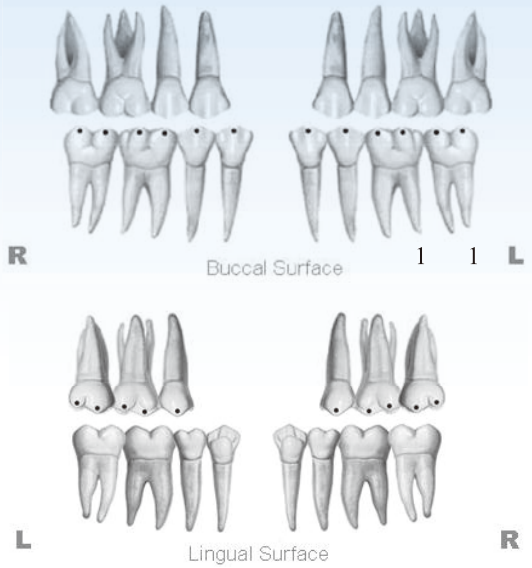
Overjet

2



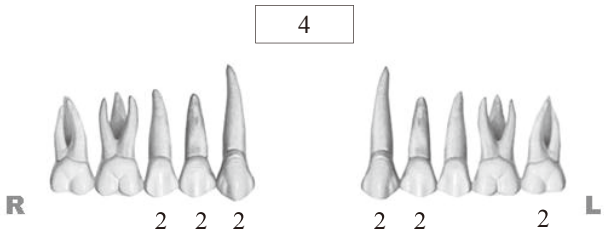
Occlusal Contacts

3



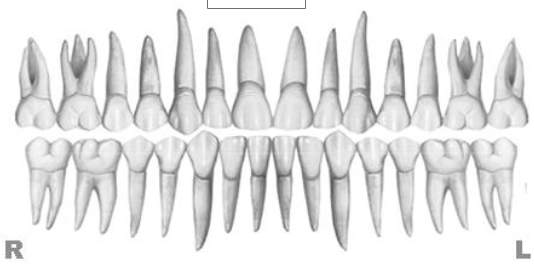
Occlusal Relationships

4



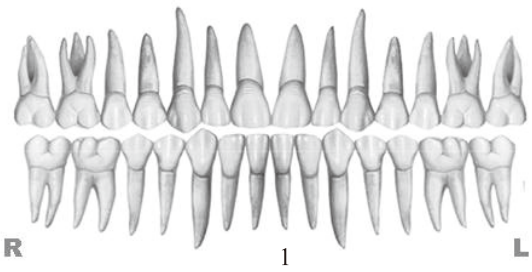
Interproximal Contacts

0



Root Angulation

2



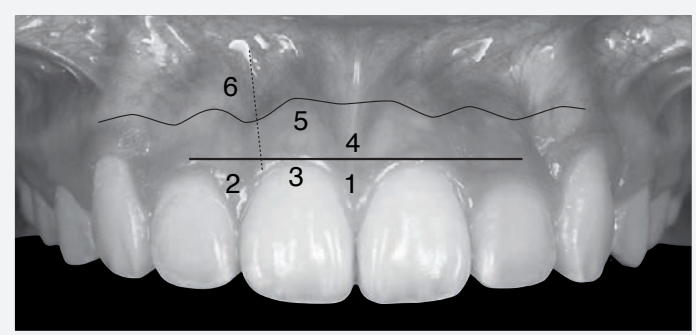
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 3

1. Pink Esthetic Score

Total = 1

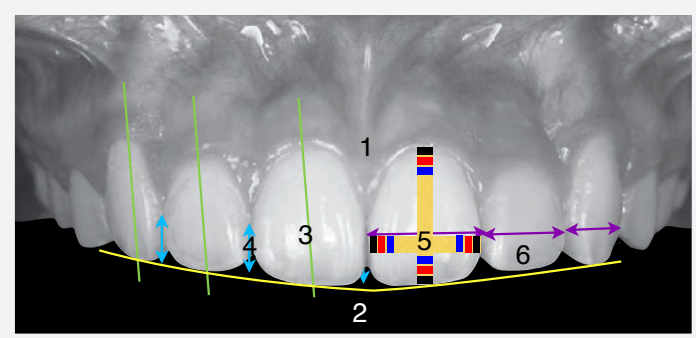


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0		2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetics)

Total = 2



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

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

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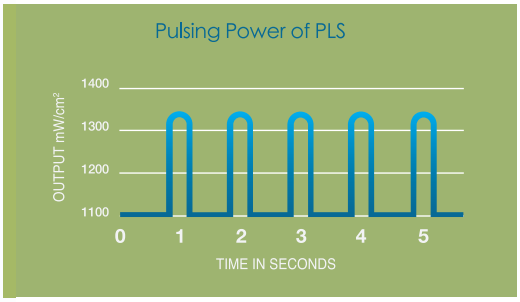

24-hour testing conducted by Kerr R&D. Data available upon request.

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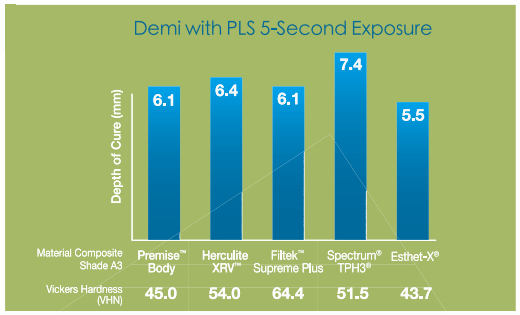
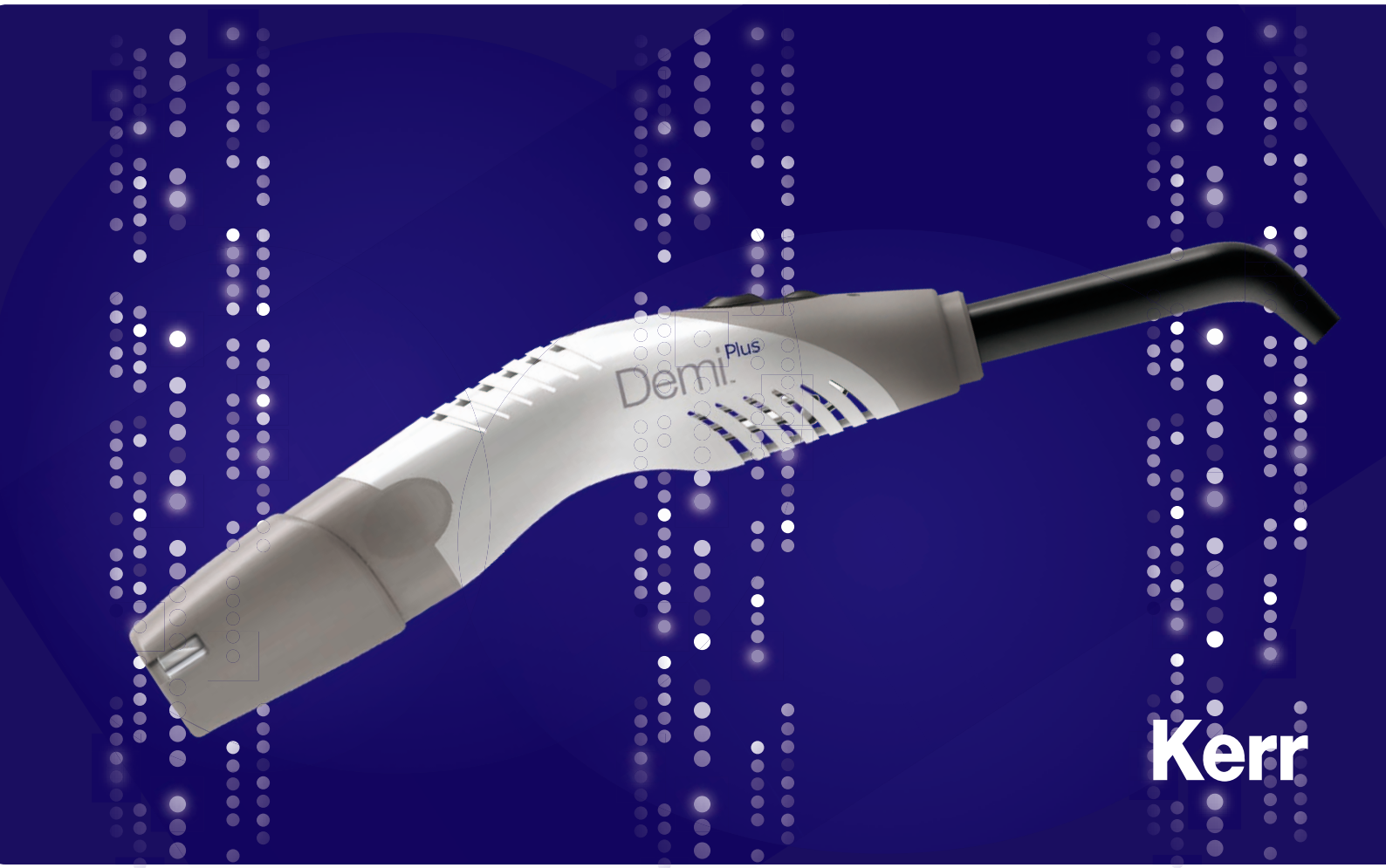


Source: Nova Southeastern University. Data available upon request.



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Beethoven Orthodontic Center's Effective Bonding Procedure

Introduction

Bonding signifies the beginning of orthodontic treatment. The precision of bonding dictates the efficiency and final quality of treatment and therefore, it is an important issue that we should consider with great care. Beethoven Orthodontic Clinic has adopted Damon® bracket system (*Ormco*) since 2005, and we keep on improving our treatment quality by routine case analysis. Now Beethoven Orthodontic Center has established a set of standard protocols which can make this important beginning more effective and achieve ideal treatment results.

Preparation for Bonding

Beethoven's assistants first collect and organize patients' pre-treatment data, including charts (*Fig. 1*) and study models before their arrival (*Fig. 2*). The treatment plan has been prescribed and documented by the principle orthodontist, Dr. Chris Chang, on the charts in previous consultation visits. Residents then study the case and mark on the study

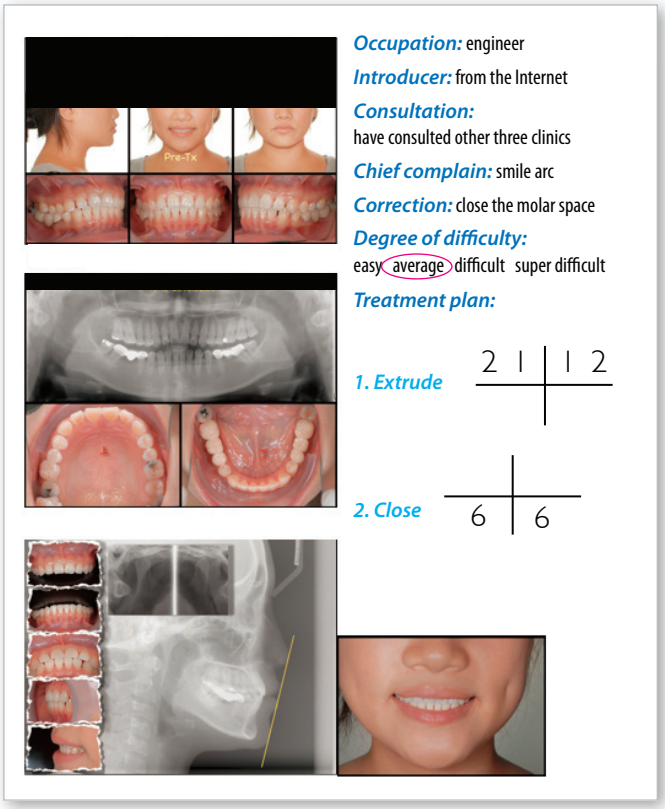
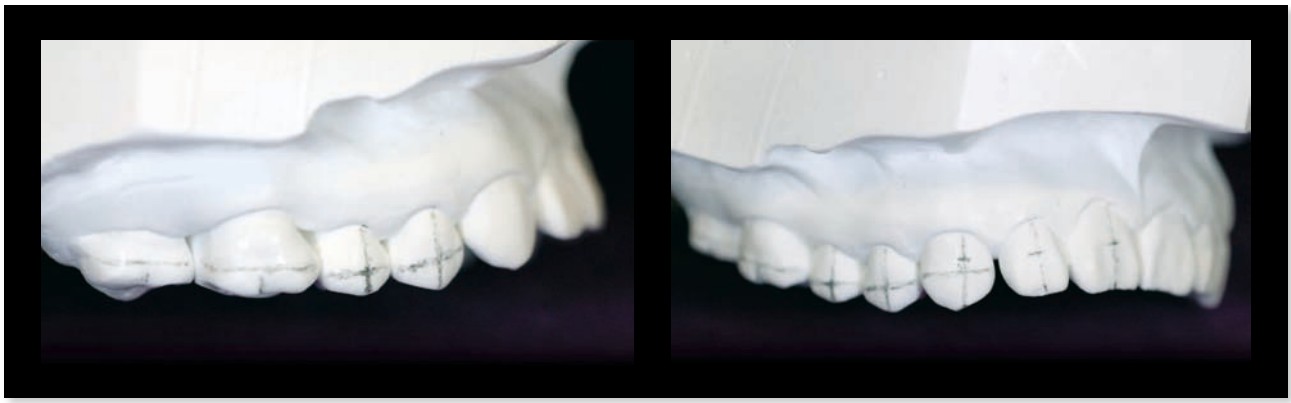


Fig. 1:
The chart includes pre-treatment intraoral and facial photographs, radiographs, and treatment plans. Photo-based charts are easier to read for patients as well as for residents.

Fig. 2: Assistants will collect and organize charts and study models before patients' arrival.

Dr. Hsin-Yin Yeh,
Lecturer, Beethoven Orthodontic Course (left)

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



■ *Fig. 3: Study models are marked before bonding.*

model (*Fig. 3*) based on the treatment plan. As such, doctors can significantly save chair-side time and increase bonding accuracy.

Bracket Placement

Beethoven Orthodontic Clinic currently uses two types of brackets, Damon Q® and Damon Clear® (*ceramic brackets of anterior teeth and maxillary premolars*). The bonding protocols are developed based on Damon, Pitts[1], Roberts, and Chang's[2-4] methods.

• Bonding Sequence:

From left second molar to first premolar; from right second molar to first premolar; from left canine to right canine.

• Bonding Principle:

The main function of posterior teeth is occlusion. Therefore, the bracket placement in this segment is based on contact points between teeth. Maxillary anterior teeth have an esthetic function, and so the bonding positions follow the shape of a smile arc. The bonding positions of mandibular anterior teeth use the overjet and overbite as references.[1]

• Bracket Position:

1. Maxillary posterior teeth: The occlusal edge of the brackets follows the contact points. The buccal groove of molar bracket pads can fit into the buccal groove of molars (*Fig. 4*).

2. Maxillary anterior teeth：Place the occlusal edge of the canine bracket at the mesial-distal

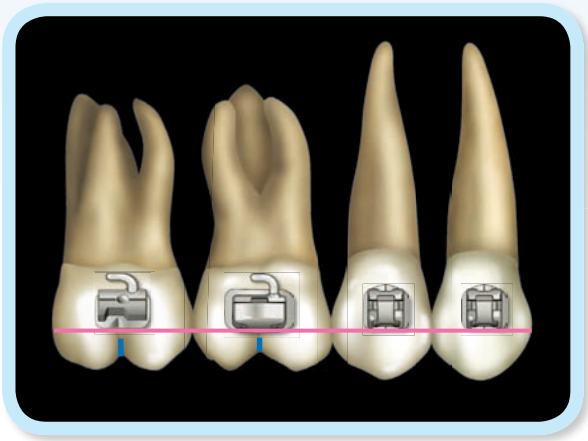


Fig. 4:

The occlusal edge of brackets follows the contact points (pink line). The buccal groove of molar bracket pad can fit into the buccal groove of molars (blue line).

reference points between the first premolar and canine. Align the canine bracket 1 mm mesially away from the long axis of the crown. Use the slot of the canine bracket as the reference for placing the incisor brackets. The slot of the lateral incisor bracket should be more gingival than the canine bracket, and the central incisor bracket should be more gingival than the lateral incisor bracket (*Fig. 5*).

3. Mandibular posterior teeth： The occlusal edge of the brackets follows the contact points. The buccal groove of the molar bracket pad can fit into the buccal groove of molars. The first molar bracket pad is wider than other brackets. Therefore, remember to place the occlusal edge of the bracket slightly more occlusally （Fig. 6).

4. Mandibular anterior teeth： Place the occlusal edge of the canine bracket at the mesial-distal reference points between the first premolar and canine. Align the canine bracket 1 mm mesially away from the long axis of crown (*Fig. 7*). The positioning of the incisor brackets depends on the vertical relationship of the bite (*Fig. 8*).

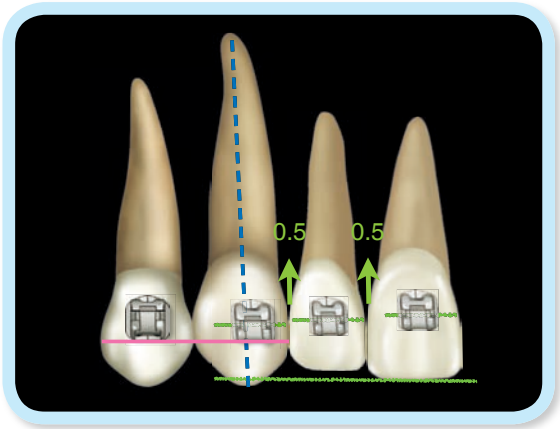


Fig. 5:

Place the occlusal edge of canine bracket at the mesial-distal reference points between first premolar and canine (pink line). Align the canine bracket 1 mm mesially away from the long axis of crown (blue dotted line). Use the slot of the canine bracket as the reference for placing the incisor brackets. The slots of the lateral and central incisor brackets are raised 0.5 mm consecutively (green line).

Fig. 6:

The occlusal edge of brackets follow the contact points (pink line). The buccal groove of molar bracket pad can fit into the buccal groove of molars (blue line). The first molar bracket pad is wider than other brackets, so place the occlusal edge of the bracket slightly more occlusally.

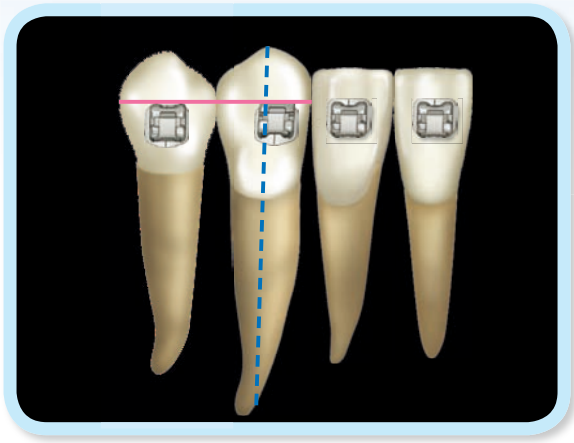


Fig. 7:

Place the occlusal edge of canine bracket at the mesial-distal reference points between the first premolar and canine. Align the canine bracket 1 mm mesially away from the long axis of crown.

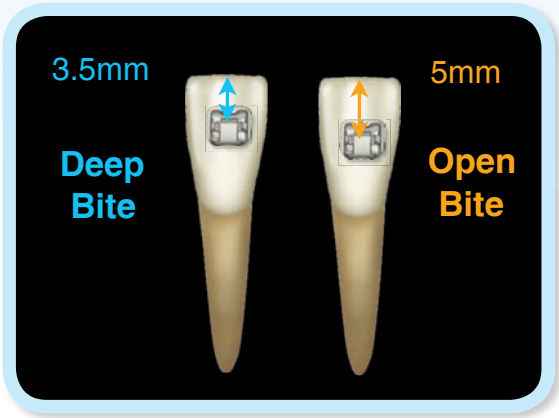


Fig. 8:

The positioning of the incisor brackets depends on the vertical relationship of the bite. For a deep bite, the top of the slot is incisally positioned, approximately 3.5 mm from the incisal edge. For an open bite, the top of the slot is gingivally positioned, approximately 5 mm from the incisal edge.[1]

Bonding Process

- Ensure Bonding Tools are Laid Out in A Logical Order:

1. Doctor's chair-side desktop: mirror, scaler, end cutter, Weingart plier, needle holder, opener, tweezer, super absorbent pad, cotton roll, dry aid, flowable light-cured composite resin, prophylaxis paste, retractor, lighter, .014 Cu-NiTi wire (*Fig. 9*).

From left to right: super absorbent pad, cotton roll, dry aid, flowable light-cure resin based composite, prophylaxis paste, retractor.

From left to right: mirror, scaler, end cutter, Weingart plier, needle holder, opener, tweezer, lighter, .014 Cu-NiTi wire.

Fig. 9. Doctor's chair-side desktop

2. Assistant's worktable：brackets, etching-gel, bonding agent, micro-brush, light cure adhesive, tweezer (*Fig. 10*).

From left to right: brackets, etching-gel, bonding agent, micro-brush, light cure resin based adhesive, tweezer.

Fig. 10: Assistant's desktop

Fig. 11: Clinical steps.

• Step-by-Step Procedures:

(1) Polish the teeth surface with prophylaxis paste.

(2) Air-dry it before applying the etching-gel.

(3) Rinse the etching-gel and air-dry the surface again. Paint the bonding agent onto the teeth.

(4) Cure the surface with curing light for about three seconds.

(5) Follow the bonding sequence. Place the brackets in a precise position onto the teeth. Cure the glue of each posterior bracket about ten seconds.

(6) Place the left canine and incisors brackets and cure the glue.

(7) Place the right canine and incisors brackets. After placing all brackets, cure the glue of every bracket for about ten seconds.

(8) Use a needle holder to pull out the gauges.

(9) Place the 0.014 Cu-NiTi archwire. At the end of the archwire, reserve about 4 mm in length and heat the last 3 mm with lighter and bend the wire ends inwards. After placing the wire into the brackets, use flowable resin to cover the end of the wire to protect patients from injury (*Fig. 12*).

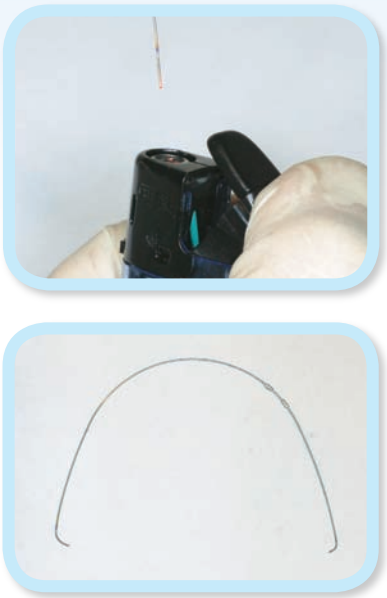


Fig. 12:
.014Cu-NiTi. Heat up the ends (3mm) and bend them inwards.

• Clinical Tips:

I. There are stoppers on the 0.014 Cu-NiTi Damon® archwire to prevent the archwire from sliding. We put these stoppers between the brackets of the central incisor. However, the stoppers are put between the brackets of the canine for esthetic consideration when placing Damon Clear® brackets (*Fig. 11-9*).

II. If there is no first molar, we connect the archwire to the second premolar rather than the second molarsince 0.014 Cu-NiTi is easily dislodged during food instakes. We will connect the archwire to the second molar when using archwires with a bigger diameter (*Fig. 13*).

Patient Instructions

After finishing brackets placement, our assistants will present patients a video to demonstrate the brushing procedures with brackets (*Fig. 14*). Furthermore, we will offer patients instructions on oral hygiene and a tooth brushing kit for oral hygiene maintenance (*Fig. 15*).

Fig. 13:

Put the stopper between the central incisor brackets. Insert the .014Cu-NiTi archwire to the second premolar rather than the second molar and use flowable resin to cover the end of the wire to protect patients from injury.

Fig. 14:

An iPad is used to show patients the correct brushing procedure.

Fig. 15:

A handout on oral hygiene and a brushing kit are provided after placement.

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1. Pitts T. Begin with the end in mind: Bracket placement and early elastics protocols for smile arc protection. Clinical impressions 2009;17(1):4-13.
2. Chang C, Roberts WE. Orthodontics, 3D i-Ortho encyclopedia, Vol I. Taiwan:Newton's A Ltd, 2012.
3. Chang C, Roberts WE. Orthodontics, 3D i-Ortho encyclopedia, Vol II. Taiwan:Newton's A Ltd, 2012.
4. Chang C, Roberts WE. Orthodontics, 3D i-Ortho encyclopedia, Vol III. Taiwan:Newton's A Ltd, 2013.

Bite Turbo 2.0

All new
Bite Turbo 2.0 longer and better!

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Value Pack

Include:

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- BT moulds x6
- BT 2.0 moulds x6
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http://orthobonescrew.com

Chris H.N. Chang, DDS, Ph.D. Founder, Beethoven Orthodontic Center

- Taiwan Orthodontic specialist
- ABO-Certified Orthodontist
- Author, 3D iBooks Ortho
- Ph.D, Dept. Orthodontics, Indiana University-Purdue
- Publisher, International Journal of Orthodontics & Implantology

The Beethoven Orthodontic and Implant Group

A Learning Organization

Tzu Han Huang

Beethoven, a worldly renowned musician, is also the name of a reputable dental clinic in Taiwan. If you google it, it ranks the 5th in the research results, with more than 6,000 findings.

The Beethoven Orthodontic and Implant Group

The Beethoven is a dynamic team, led by Dr. Chris Chang, with its base in orthodontics but quickly extending to general practice, pedodontic center, as well as specialized care in periodontics, prosthodontics and implant dentistry. The team is consisted of excellent specialists as well as dental assistants. In addition to dental clinics, the Beethoven group established a subsidiary, Newton's A, Inc, whose primary focuses include dental information technology, development of dental equipment and dental education .

Beethoven Orthodontic Center-Environment

When you first enter the clinic, you will be immediately greeted by the beautiful and warm smile of our assistants. We have a very spacious waiting area and consultation space surrounded by lines of bookshelves with a wide selection of books and magazines to entertain you. What's even more precious is the open atmosphere created by French window and ample natural lighting .

Such a stress-free environment is appreciated by not only patients but also doctors who spend all day in the clinic. The green bamboos from the outside is a soothing reminder of another beautiful day at work. The open design of the waiting area aims to create ample space for patients and facilitate communication between parents and doctors. This type of space design also allows a smooth and efficient workflow when patients arrive during peak hours .

The supply station is located at the rear side of the chairs, mainly for equipment and patient records. In addition, the technology structure is built on a Mac-based system, using Apple desktops, iMac, to store patient data, run the customized patient appointment system and its native presentation software, Keynote, to guide clinical consultation. All patients ' records and photos are entered and saved before the end of a clinic session. The saved data is also shared between computers located in the internal network .

Orthodontic Center

Beethoven Orthodontic Center-Management system

One of the most unique features of the Beethoven clinic is its efficient management system. The high volume of patient traffic and the frequent changes of the on-call residents and specialists in different days of the week create a significant challenge to ensure efficiency and consistent quality of care. An example of our management tools is a simple, concise, image-based patient record. You can clearly identify a patient's background, extra-oral, intra-shots, chief complaints, source of referral, treatment plans, all in a piece of A4 size paper. All doctors can easily pick up a patient record and immediately follow the instructions left from the previous visit. Most of all, an ideal treatment outcome can still be obtained despite the changes in doctors. The aim of this management system is to create an simple model with great precision and predictability.

Dr. Park and the Korean delegates, together with the Beethoven Orthodontic Group's staff.

Continuing Education

Indonesian doctors practicing screw placement on a model.

One may wonder how doctors can continue to update their knowledge and skills in today's busy world. The answer for Beethoven's doctors is the standardized training process. All residents in Beethoven have to complete Beethoven's Comprehensive Damon Q course, the Advanced Damon Course and continue their pursuit of excellence in the Finishing course. Dr. Chang's teaching style is very interactive and engaging, filled with fresh cases. Students constantly find cases they just saw last week or yesterday at the clinic, demonstrated and analyzed in the class next day .

International Course

Beethoven's courses are not only designed for the local doctors; many doctors from overseas also attend the customized international workshop. The response from the participants were so overwhelmingly positive that several of them repeated the class. Besides providing international courses, Dr. Chang is frequently invited to give lectures around the world and brining the most up-to-date news and internationally renowned speakers back to Taiwan's audience .

International Journal of Orthodontics & Implantology

After over a decade of service to the people in Hsinchu, Dr. Chang has won the trust and support of his patients. In addition to providing orthodontic treatment, Dr. Chang dedicates most of his energy to providing continuing education and devoting himself to academic exchange locally and internationally. In order to provide a platform for dentists to share their clinical experiences, Dr. Chang also publishes a quarterly journal, News & Trends in Orthodontics, now renamed as International Journal of Orthodontics & Implantology. Famous doctors in Taiwan and abroad frequently share their clinical secrets or summaries of recent lectures in the journal. We hope through this channel we can spread the messages of knowledge sharing and pursuit of excellence to our readers .

The Beethoven Team

The Beethoven team is not only consisted of Dr. Chang himself. We have a team of doctors specializing in pedodontics, prosthetics, periodontics as well as implant therapy. So we can take care of patients from 1 year old to 99 years old. In addition to specialized care, we also have a general practice taking care of patients common dental issues. Through this comprehensive approach, we can provide total care to our patients .

Needless to say, dental assistants play an indispensable role in Beethoven's operating system. When every new patient enters the clinic, he or she will immediately be greeted by a professional assistant whose main function is to provide orthodontic consultation.The assistant will walk you through the consultation process, explain the data she will collect in this visit, including photos and X-rays, and the fees and stages of the treatment process. In terms of controlling the flow of patients during a clinic session, a senior assistant acts as the conductor in the clinic, assigning assistants to each chair and notifying doctors the order of patient sequence. Assistants are the crucial link between doctors and patients. If you think your assistants haven't met your expectations, you can consider signing up for Beethoven's assistant training for them .

The Beethoven team

Andersen Pedodontic Center

Guarding children's dental health

Andersen Pedodontic Center-Introduction

After serving the local community for over a decade, the local community leader approached Dr. Chang to express the community's needs for a doctor who understands children's dental health. At the time when children had toothache , parents have to travel to the crowded city center for treatment. In response to such wishes from his own community, and the repeated requests from parents of his orthodontic patients, he and Dr. Hsu together established "Andersen Pedodontic Center". "Our mission is to create an environment where parents can feel safe, children can experience joy and doctors can provide the best possible care to children", Dr. Hsu said.

Flower-decorated ceiling is what children see during treatment.

Newton's A

Dental education center

The constant dilema for successful dentists is the conflict between time and need for continuing education. It's almost a luxury to devote one's full attention to a full-day lecture or a new book. Newton's A understands doctors ' needs for a more flexible and effective method of learning and has turned Beethoven's excellent teaching materials to videos. Combined with a mobile device, such as iPad or iPod touch, one can learn orthodontics anytime and anywhere. This latest utilization of technology has revolutionized the orthodontic world .

Newton's A-Mobile Learning : Mobile learning + iPad

Dr. Chang is the first dentist to combine the three seemingly distinctive but closely related courses, Damon orthodontics, orthodontic bone screws and assistant training into easy viewing educational presentation videos. Using Mac's native presentation software, Keynote, he can instantly record live narration with his slides and turn his lecture into an engaging movie. Students can use these videos as electronic notes, carry them in their iPod or iPad wherever they are and review the content whenever they want. Whether you are past, current or prospective students of Beethoven , you can use these videos for course preview or review to enhance the learning experience. Since the content is digitalized and frequently updated, students won't have to worry about being outdated once they purchase the course videos .

Newton's A-Effective teaching tools : Mac + Keynote

In addition to produce professional dental educational podcast, Newton's A is also in charge of the design, execution and maintenance of Beethoven's technical environment. For example, recently the chairman of the premier teaching hospitals in Taiwan came to visit Beethoven with his son-in-law from the US. During the visit Dr. Chang performed an out-patient surgery. Some trained assistants provided clinical assistance to Dr. Chang while others took photos and videorecorded the procedures in small segments. Immediately after the surgery, assistants uploaded the patients' photos and videos and organized them in Beethoven's standardized patient record template, utilizing Mac's presentation software, Keynote. So Dr. Chang then used data from the previous visits as well as the procedures that just took place a moment ago to demonstrate to the patient the treatment progress and surgery process instantly. Followed by the presentation to the patient, Dr. Chang used the same file to continue a further in-depth discussion with the chairman .

A case report as described may take several interns a week to complete in other institutions. With the aid of proper technology, one can finish such tasks in less than 30 minutes .

This wonderful combination of Mac and Keynote makes preparing case reports, producing educational materials or presenting treatment progress to doctors, assistants, patients or parents so easy and effective. The built-in recording function allows presenters to record voiceover as the slides advance so the audience can better appreciate the content .

Newton's A- OrthoBoneScrew

Originated from Beethoven's clinical experiences, Dr. Chang is leading a team of experts from academia and engineering to develop an orthodontic mini anchorage device, OrthoBoneScrew. The research and development team include experts from University of Indiana-Purdue's

Andersen Pedodontic Center-Environment

The clinic is named after the famous children's book author, Hans Andersen. The image design of the clinic is inspired by Andersen's most famous fairy tales, the emperor's new clothes, the little match girl and thumbelina. Dr. Hsu hopes visiting the clinic can bring children not just the thought of stinky smell or feary drills but also beautiful stories. Besides the pleasant visual stimulants, the brushing station is designed at three levels to fit the varying heights of children of different development stages .

Andersen-Long-term dental growth data preservation

Andersen's mission is to serve as the guardian of children's dental health. In order to closely monitor kids' growth, we routinely take intra-oral, extra-oral photos and X-rays to make sure we won't miss the first sign of an emerging problem at a later stage. To achieve this goal, we use high quality digital cameras and wireless memory cards to ensure fast and secure data transmission. Mac's dual operating system allows us to take advantage of both windows and Mac's functions .

Andersen-Children's health education

Prevention is better than cure. This is particularly true for parents battling with young children's cavity. In view of this common challenge for parents, Andersen regularly collaborates with local kindergartens to administer supplemental fluoride. Parents can also play a strong advocate for children's dental health by helping children develop proper concepts and practices of dental hygiene .

professor of Emeritus, Dr. Eugene Roberts, Dr. John Lin and Dr. Lin Shan Jie from National Central University in Taiwan. Our products have improved over the last two years and received positive feedback from orthodontists in Taiwan and abroad. The combined use of bone screw and Damon can significantly reduce extraction rates in borderline surgical cases. Cases that traditionally require surgery can achieve satisfactory results with the use of orthodontic bone screws .

Newton's A-E-books, BDE App

In 2012 Newton's A published the world's first 3D, interactive orthodontic textbook series, Orthodontics Vol. I & II, authored by Drs. Eugene Roberts and Chris Chang. In addition to an extensive collection of ABO-board quality case reports on its hard copy version, the ebook (iOS) version features 3D models, videos, presentations and support note functions and end-of-chapter quiz. This is a dreams come true for all educators. This series was described by Dr. Larry White as, "**the most astonishing, helpful and innovative texts the orthodontic profession has ever seen.**" In 2013 the third and latest volume focuses on Class III malocclusion and has additional contributors, Drs. John Lin and Johnny Liaw.

In addition to text-based educational resources, Newton's A also publishes Dr. Chang's extensive lecture video podcasts and creates an free App (iOS), **Beethoven Dental Encyclopedia** (BDE) for users to purchase and download directly to their iPads. So learning orthodontics can be as fun, easy, practical and readily accessible as ever.

Implant Center

Ortho-Implant combined treatment

In recent years Beethoven have seen a growing number of adult patients seeking treatment for missing teeth. This indicates a stronger need for esthetic appearance for adult patients. However, this brings a new set of challenges for orthodontists because the problems are far more complex than creating ideal alignment. Patients often have periodontal problems, multiple missing teeth and the reconstruction of prosthetics or implant placement. Hence, Beethoven believes providing adult patients a comprehensive treatment is our new goal.

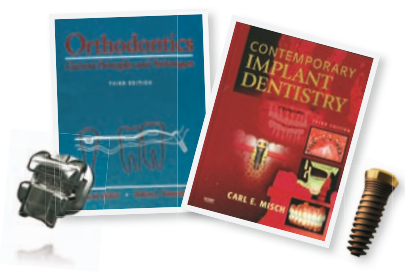
Traditionally adult dental treatment can be summarized in two words, periodontics and prosthetics. However, in the era of inter-disciplinary treatment, orthodontics and implantology have become the new two pillars in this treatment structure. Orthodontics can lay a solid foundation to suppor future implant placement. Therefore, the establishment of the new implant center is to provide a more comprehensive care to our patients in our dental network.

In October, 2011 Newton Implant Center is established to fulfill such needs that were not adequately met previous in the Beethoven. Dental Group. The new Center marks Beethoven's milestone in providing interdisciplinary treatment. Equipped with the latest 3D technology, Newton now has the capacity to provide diagnostic information on impaction for orthodontic treatment, and bone quality assessment for implant therapy. In addition, Newton also applies the latest cloud technology to manage clinical data as well as provide patient consultation and staff continuing education.

BEETHOVEN

"None of these can be possible without my two great mentors", said Dr. Chris Chang. He contributed this recent shift of focus to the inspirations by Dr. Homayoun Zadeh from USC and Dr. Kwang Bum Park from UCLA. Dr. Homa is a strong advocate and dedicated educator on promoting evidence-based implant therapy. Since 2010 Beethoven and USC has collaborated to annually provide a six-month international certificate course to doctors in Taiwan. Armed with solid knowledge foundation, Dr. Park, faculty of UCLA, CEO of Megagene, one of the fastest growing implant cooperation and MIA, one of the largest dental hospitals in Korea, inspired Dr. Chang with his business management wisdom. After two years of immersing himself in the learning of implantology from an orthodontic perspective, Dr. Chang and many of the experts in these two fields, all agree that implant-ortho combined treatment is the future of dentistry. In order to promote the study and practice of implant-ortho combined treatment, Dr. Chang, together with world leaders in orthodontics and implantology, such as Drs. Eugene Roberts, John Lin * (林錦榮醫師), Fernando Vizcaya, established International Association of Orthodontists & Implantologists (iAOI) in October, 2011. Beethoven's previous orthodontic journal, News and Trends in Orthodontics (NTO), is now changed to International Journal of Orthodontics & Implantology (IJOI). As member of iAOI, one can view the latest lectures of iAOI's consultants or read all issues of its publications from the comfort of their home or when they are on the go. Learning can never be easier.

"All we doctors do is aimed to provide the best possible care to our patients", Dr. Chang stresses. Based on this philosophy, the core value of the Beethoven Dental Group is education. As medical technology and innovation evolve, doctors need to constantly renew their knowledge and skills through continuing education. We hope doctors sharing the same commitment to quality patient care and passion for learning can join iAOI, the future of dentistry !



XV1

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The XV1 employs Orascoptic's smallest and most lightweight headlight.

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The XV1's power source is housed within the temple arms, eliminating the need for a battery pack, while offering 6-10 hours of runtime.

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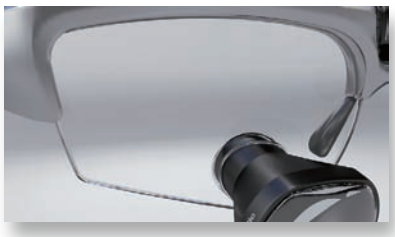
The XV1 supports all of our award-winning HiRes and HiRes Plus telescopes.

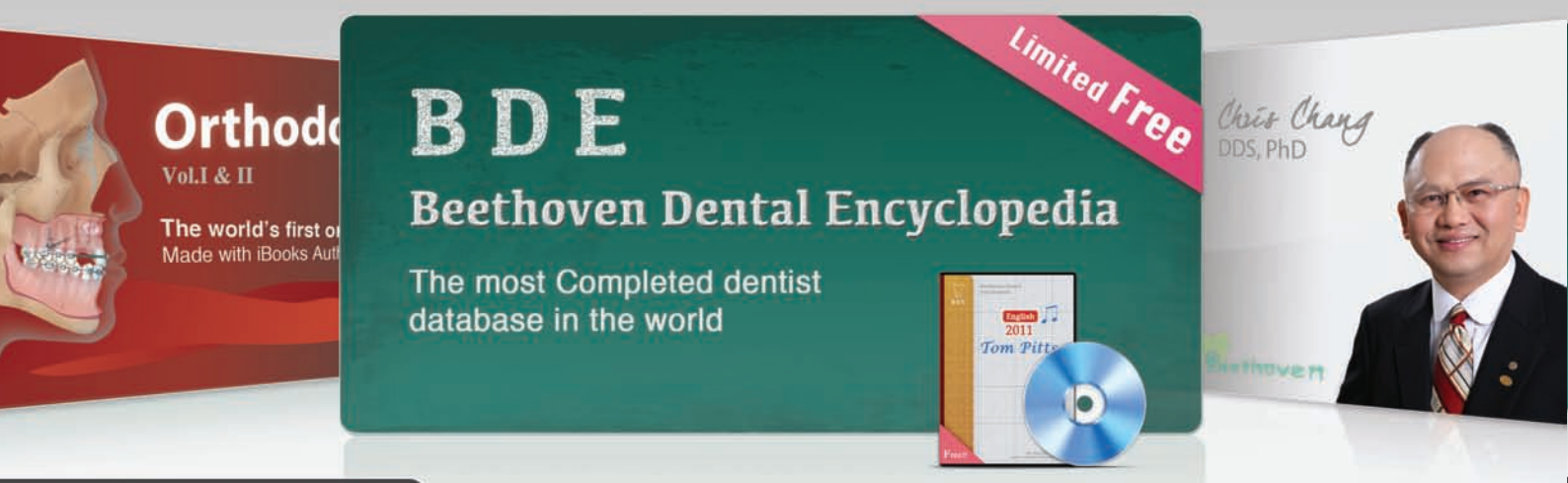


Support for Prescriptions

The XV1 lenses support a wide variety of eye prescriptions, including bifocals.

Variety of Colors

The XV1 is available in a variety of colors to match your personal style.



App of the Best

BDE – Beethoven Dental Encyclopedia

Limited Free

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

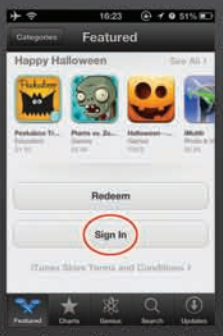
Free App

This app is designed for iPad, iPhone and iPod touch

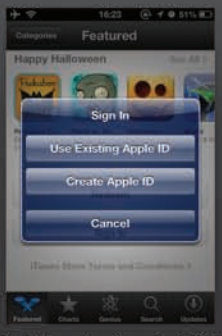
Available on the App Store

Manual – Step by Step

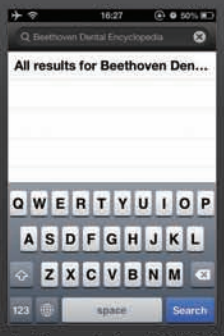
1. Go to App Store on your device.



2. "Sign in" with your Apple ID.

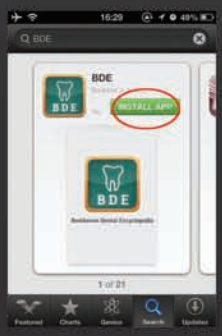


3. "Create Apple ID" if you don't have one.



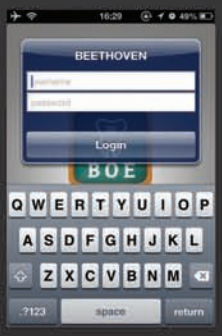
4. Search for "OBS."

5. Click "FREE."



6. Click "INSTALL APP."

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



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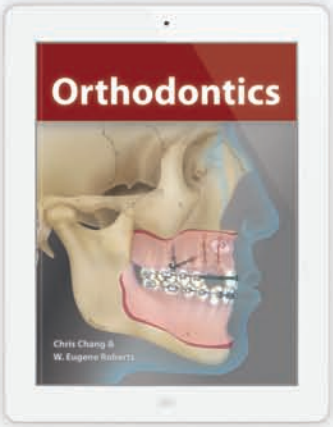


Buy Book

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

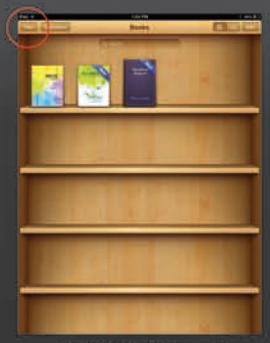
Beethoven Dental Encyclopedia e-Book

Beethoven Orthodontic and Implant Group, based in Hsinchu, Taiwan, has been serving our community since 1996. In additional to providing comprehensive, patient-centered care, Beethoven continues to transcend itself by delivering dental training courses, engaging in clinical research and regularly publishing world-class journal, International Journal of Orthodontics and Implantology (IJOI).

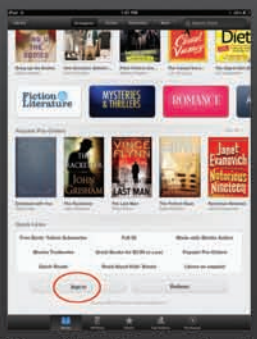
Over the years many complex and excellently finished cases are published in IJOI. By popular demands a special selection of these cases, Orthodontics, is now available in hard copy and electronic (iBooks) edition. Besides well-documented treatment process and analysis, Orthodontics is also the world's first interactive orthodontic e-textbook. Once opening this book, your understanding of orthodontics will never be the same!

Manual – Step by Step

1. Launch "iBooks" app on your iPad.



2. Click "Store."



3. "Sign in" with your Apple ID.

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

5. Search for "Orthodontics."

6. Click the book's icon.

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

8. Once downloaded, click "Orthodontics" to launch the e-book and enjoy the awesome content!

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Newton's A

Orthodontics, Volumes I, II and III

Dr. Chris Chang and Dr. W. Eugene Roberts

Drs. Chris Chang and W. Eugene Roberts have combined their unique and distinctive talents to produce the most remarkable and extraordinary texts orthodontists have ever seen or profited from. By using the e-publishing software iBooks® (*Apple*) Author developed by Apple, they have combined narratives, photos, videos, video interviews, and illustrations into an instrument of learning that not only informs and astonishes the reader but supplies professional knowledge that is fun to absorb.

For example, it is one thing to read about, and dread the placement of, a Zygomatic Temporary Anchorage Device or even see isolated photographs of a technique, but it is an altogether magnified experience to see a clinician complete the procedure in a video in less than 1 minute. These graphic illustrations, supplemented by a live video of the clinical procedure, mitigate any doubts and confusions one might have about the method.

Ad executive Fred Barnard first published in the San Antonio Light in 1918 the well-known aphorism, "*A picture is worth a thousand words.*" Barnard later attributed the aphorism to Confucius because he thought people would pay more attention to it, and, of course, they did. If that epigram is true, then the publications Drs. Chang and Roberts have developed must be worth millions of words.

These volumes provide orthodontic clinicians with the most lively and responsive features yet produced in orthodontic literature. The excellent therapies displayed in these interactive productions must have taken enormous skill, patience, and exquisite judgment. No current orthodontic tome can equal the unsurpassed illustrations, clinical photos, and a myriad of video sequences collected in these three books. It is nothing less than a professional triumph of publication imagination and creativity, and they deserve inclusion in every orthodontic library.

These iBooks are also available in hard copy editions with familiar photos, narratives and illustrations, but these lose the interactive energy, liveliness, and portability the iBooks offer on an iPad®. Nevertheless, for those who prefer holding a book and turning pages, that option is accessible. However, by just using a swipe of the finger on an iPad to move from written narrative to illustration and then to video or to bibliography offers a completely up-to- date and boosted learning experience.

Volume I is intended as a clinical atlas that demonstrates innovative approaches to diagnosis, treatment, and evaluation of treatment outcomes. The first three chapters describe the use of the American Board of Orthodontics' prescriptions for evaluating the complexity of malocclusions and gauging the treatment outcomes. All of the included therapies of this book are subjected to the ABO evaluations, which makes them even more impressive. Following chapters deal with palatally impacted canines, scissor bites, bimaxillary protrusions, high maxillary canine impactions, treatment of high angle malocclusions, low angle malocclusions, anterior crossbites, and Class III skeletal malocclusions.

Volume II's first four chapters deal with various Class III malocclusions and their successful therapies. The next two chapters deal with treatments for open bites, while the next four chapters offer therapies for Class I and Class II deep overbites. Four chapters offer readers detailed descriptions of

soft tissue treatments for subperiosteal grafts and impacted teeth. The final two chapters furnish users with more applications of TADs.

Each chapter is accompanied with ample bibliographies and tests at the conclusion of the chapters to give feedback regarding the learning accomplished.

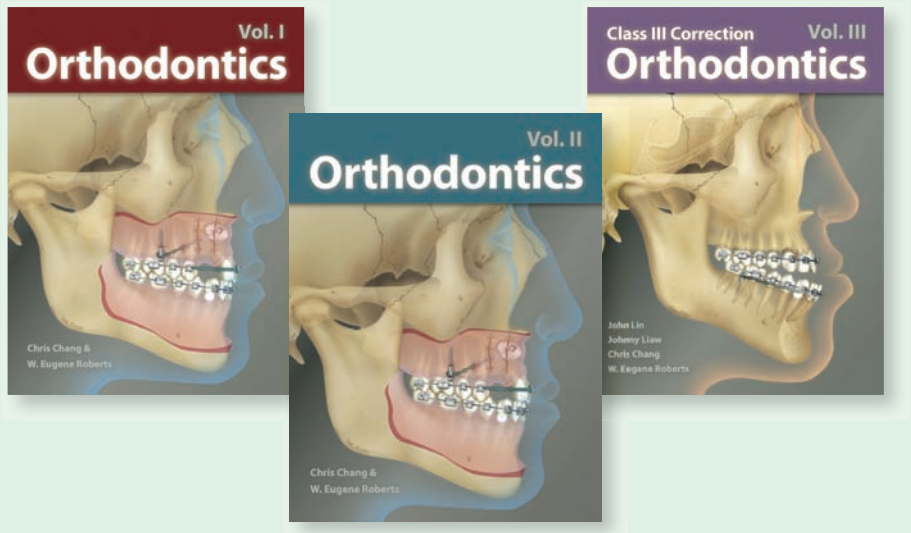
Volume III has additional authors, Drs. John Lin and Johnny Liaw, and this volume dedicates itself exclusively to the diagnosis, treatment planning, and therapy for Class III malocclusions. The first chapter wisely contributes a most practical and useful recommendation for accurately diagnosing and treatment planning for Class III patients. This is followed by treatments for Class III siblings and therapies for twins with skeletal Class III malocclusions. Succeeding chapters deal with Class III open bites, asymmetries, hyperdivergent mandibles, retraction of molars in all four quadrants, early interventions in Class III patients, and the paradigm shift that TADs now offer the profession, among other topics.

The astounding therapies in these books are nothing short of staggering and set a new standard for orthodontic clinicians and their patients. Jacob Bronowski once said in The Ascent of Man, "*The strongest power in the ascent of man is his pleasure in his own skill. He loves to do what he does well, and having done it well, he loves to do it better.*" Drs. Chang, Roberts, Lin and Liaw have certainly shown the profession how to do it better.

Review by

Larry W. White, DDS, MSD

This review is reprinted from the Journal of Clinical Orthodontics



Feedback from the International Damon, OBS & VISTA Workshop

Dear Dr. Chang,

I am writing this note to express my gratitude for the great influence that your knowledge and your life philosophy have positively impacted my professional development. The first course I took with you became the spearhead for my projection as a better professional. From a clinical point of view, I have seen the improvement from the rapid results of my patients. As a lecturer, I have learned from you on how to manage the audience, making it a warm and participatory environment conducive to high quality learning. All this, supported by the careful and thoughtful preparation of every presentation, and the use of the very best tools and technology, such as Keynote, although still a rookie, I have been able to continue improving my teaching.

Since I took the first class with you, I have felt the urge to be in contact with you, your work system, and your research environment. For this reason, I gathered an excellent group of professionals and teachers from Brazil, Colombia and the United States to join me to Taiwan to receive your valuable, creative, and open teachings. They have thanked me and you for giving them such a wonderful learning experience.

From the bottom of my heart, I thank you for being the greatest influence to my professional development. I will always be mindful of your lessons. Please send a warm greeting to your lovely wife, who has always welcomed us with hospitality in your beautiful and friendly country.

Sincerely,

Patricia Vergara Villarreal
Orthodontist, the Military University. CIEO. of Bogota

A Trip to "Easyland"

10 of us from North and South America traveled to Taiwan for six days. We hoped to learn orthodontics from one of the most incredible doctors who gives the most practical lectures we have ever heard. When I finally started this wonderful experience, I discovered that I was going to learn a lot more about many things. Besides three incredible and very well organized courses which were full of valuable information, I found a very generous doctor and his very generous group that really wanted to ensure that we grasped all they wanted to transmit. I feel I grew a lot as an orthodontist. Now I think, "it is easy", as Dr. Chang alway says. We also learned about organization, collaboration, generosity all in one space that I called-Easyland.

Thank you for this beautiful experience and thank Tzu Han and everybody in your group.

Elsa Arango Pilonieta
Orthodontist UNICIEO
Scientific Director, Orto- Kids Colombia

I have attended and participated in many continuing education events. This in-office course offered by Dr. Chris Chang was excellent in every way. Every detail of the experience was carefully planned and executed to allow attendees to really focus and learn. The facility of the Apple Store auditorium was wonderful. The Hotel accommodations and food were exceptional. I was amazed at the attention each attendee received from Chris's team as they walked us through Buccal Shelf and Infrazygomatic crest TAD placement as well as the VISTA procedure. As an orthodontist, having the opportunity to practice suturing and VISTA on a pig mandible was fantastic! It was also a thrill to have Dr. John Lin attend as a guest lecture. His influence was extraordinary. Those clinicians interesting in stretching themselves for improvement should attend with an open mind and willingness to reach for new challenges that they haven't achieved for themselves or their patients. I loved the entire event and strongly recommend it to all. Feel free to connect with me at johnpobanz@gmail.com.

With heartfelt sincerity and thanks,

John Pobanz
DDS, MS
Private Practice in Ogden, Utah

I was shocked when I first attended Dr. Chris' presentation in 2008. The slides was well organized with lots of simple visuals and the speaker was more than persuasive. I was deeply impressed by his smart and captivating style, like Steve Jobs, who was famous for speaking directly to the audience.

I have been using Keynote for over 10 years. Now, having taken his workshop, I have learned the latest skills to make the best out of Keynote and the importance of focusing on the topics that presenters want to emphasize.

Thanks so much Dr. Rungsi, Dr.Chris and Newton's A young staff members!

Now I am so happy that I could join their Keynote workshops.

池森 由幸
Yoshiyuki IKEMORI DDS, PhD

It's an honor to have the opportunity to share my unique experience of attending Dr. Chris Chang's International Damon, OBS and VISTA Workshop in Taiwan. Dr. Chris Chang is a visionary leader of a very well trained team, that is consisted of excellence in Orthodontics. His ideas concerning the use of miniscrews combined with self-ligating mechanics is amazing and make things much easier for well trained clinicians. In addition, his VISTA approach opens up more possibilities for difficult cases, like impacted cuspids, and more. The Keynote workshop is also a wonderful opportunity to improve our presentation skills utilizing this amazing tool. Finally, having the chance to know Dr. Chris philosophy and inspirations, and visiting his home and personal library, gave me new perspectives on professional development. This tour into his private world is also an example of his geniality and generosity.

Once in while we have the privilege to meet special people and this can turn into a life-turning experience in our personal lives and professional careers. I look forward to returning to Taiwan for further great experiences in the future. I truly recommend this program and all of their published material available online. I also would like to express my sincere gratitude to Shufen, Dr. Chris wife, Tzu Han, the Education and Public Relations Manager and to the teams of Beethoven and Newton's A. Cheers!!!

-Specialist in Orthodontics and Dentofacial Orthopedics from University of Parana, Brazil
-3D Diagnosis in Orthodontics - The applied Cone-beam Tomography (book's author/ Napoleao Publisher)

Mauricio Accorsi,
DDS, MSc.

Dear Dr. Chang,

Recently I had the privilege to visit your offices in Taiwan and I wanted to thank you for an interesting day. I was impressed with your great managerial skills and your dedication to providing good dentistry for your patients. It is very impressive what you have put together with clinics that seem to cover all dental needs under more or less one roof. Your Apple shop was most impressive and the ebooks you have created will undoubtedly be big sellers in the orthodontic community, as the rightfully deserve. Thank you also for your little book with Steve Jobs quotes and for the statue of Angle. No doubt you have become quite a trend setter in your home country and abroad and your dedication to orthodontics is unquestionable. Thank you again for meeting with me and giving me the grand tour.

Sincerely,

Ib Leth Nielsen,
DDS, MSc
Program Director of Post Graduate Orthodontics
Department of Orofacial Sciences, University of California

I nternational
Association for
Orthodontists &
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.

3. Diplomate

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

4. Ambassador

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

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

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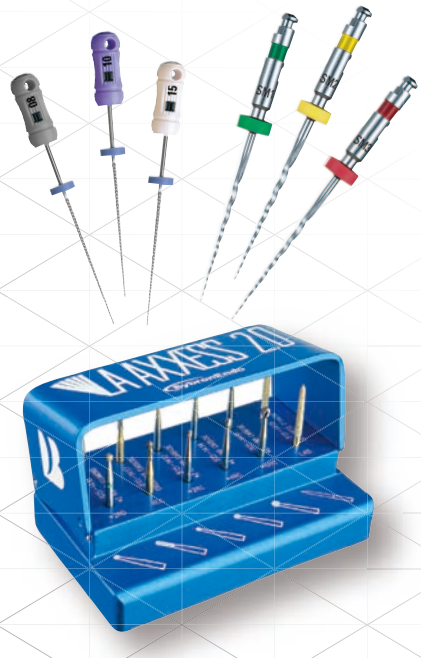
(1) LA Axxess 2.0 Bur Kit

TF ADAPTIVE



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Keynote Workshop
高效簡報學習法 系列課程

輕鬆製作簡報

K1 簡報聖經 2014.07.24

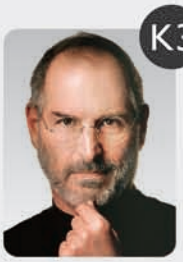
看過太多充滿複雜文字和圖表的幻燈片，聽過就忘了的演講嗎？這堂課將教您如何製作目眩神迷、印象深刻的簡報。透過小班教學，貼身指導，讓您在八小時裡輕鬆掌握簡報技巧。

學習重點：1. 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 2014.8.14

這堂課將為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，不但讓您知其然，更知其所然！

學習重點：1. Dr. Kokich 十大演講秘訣　2. 準備演講九步驟　3. 多媒體剪輯



K3 賈伯斯令人目眩神迷的五項演講技巧 2014.09.11

這堂課將為大家逐步解析跨界演講大師賈伯斯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. 賈伯斯五項演講技巧　2. 幻燈片設計概念　3. 幻燈片修改應用

連續報名K1~3
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1. 課程當日之前結清款項，才能享有 9 折優惠。
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繪圖簡報達人

Lecturer:
Dr. Rungsi Thavarungkul

K4 K5 K6 經修繪圖及動畫技巧 2014.12.05-07

- 學會使用繪圖板。
- 在 Keynote 內繪製插圖，並運用動畫效果完美呈現。
- 用 Adobe Illustrator 和 Photoshop 創造複雜的構件。
- 完美整合 Adobe 繪圖及 Keynote 實用技巧。

報名 2014 K456 課程即 贈送 2013 及 2014 課程視訊。

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1. 限額 25 名，以繳費順序為依據。
2. 舊生重溫價 9,000 元，限額 6 名。
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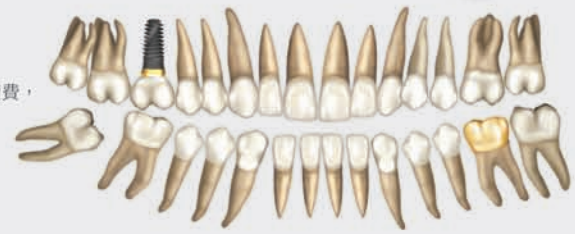


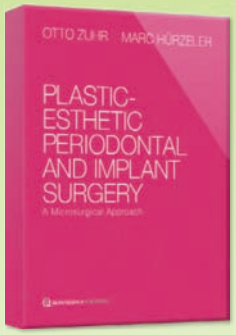
Advanced Keynote Animation & Illustration Workshop 2014.12.05-07

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.

Learning objectives

- Basic application of a 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 composition.

當矯正遇上植牙



2014 Newton's A Implant
金牛頓植牙論壇

Implant Technique + DDx + Fundamentals

現在的牙科治療已經是各科統合彙整的時代，協同矯正、植體、牙周、補綴讓治療成果臻於完美是我們追求的目標。2014年的課程規劃再突破，精選四年來在台舉辦 USC南加大植牙進修課程精華，由在臨床及演講領域裡經驗豐富的張慧男、蘇筌瑋和邱上珍醫師共同主講，精讀 Plastic-Esthetic Periodontal And Implant Surgery: A Microsurgical Approach（牙周整形美容與植牙手術 ）一書，深入分析案例，化繁為簡，植牙入門者可以輕鬆、有效率地學習，專科醫師也可獲得全新的植牙概念及技術，持續精進！

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。
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書 視 課 品

2014 Newton's Implant

	日期	USC 學程精選 （主講：張慧男、蘇筌瑋、邱上珍醫師）	Book review (Plastic-Esthetic Periodontal And Implant Surgery: A Microsurgical Approach)
1	2/21	Dr. Fernando: 2B3D ideal implant position 植體的理想位置分析	CH. 1,2 牙周與植體周邊構造 / 顯微手術介紹與應用
2	3/28	Dr. Fernando: Material selection 植體組件的構成與選擇	CH. 3,4 成功的關鍵 / 癒合、切線、翻瓣設計與縫合
3	4/25	Dr. Homa: Immediate implant placement timing 立即植體的放置時機	CH. 5,6 前牙美學準則：指引、診斷、策略
4	5/30	Dr. Homa: VISTA technique 前庭垂直切線骨膜下隧道術	CH. 7 自體移植體移取
5	6/27	Dr. Baldwin: Abutment selection 補綴支台齒的選擇	CH. 8 牙齦增進術
6	7/25	Dr. Wallace: Sinus augmentation 上顎竇增高術	CH. 9 牙齦萎縮
7	8/22	Dr. Chiu: Hard tissue management 硬組織重建的操作技巧與注意事項	CH. 10 美觀牙冠增長術
8	9/12	Dr. Stanford: Implant prosthesis 植牙膺復學	CH. 11 牙齦乳突重建
9	10/31	Dr. Baldwin: Implant occlusion 植體咬合力量分析	CH. 12 拔牙窩洞處置
10	11/28	特別演講　張燕清主任	
11	12/26	Dr. Chris: IAOI ortho-implant case report 植牙矯正完整示範案例	CH. 13 缺牙修復

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。

～本文摘錄自2010最新一期《台大牙友》

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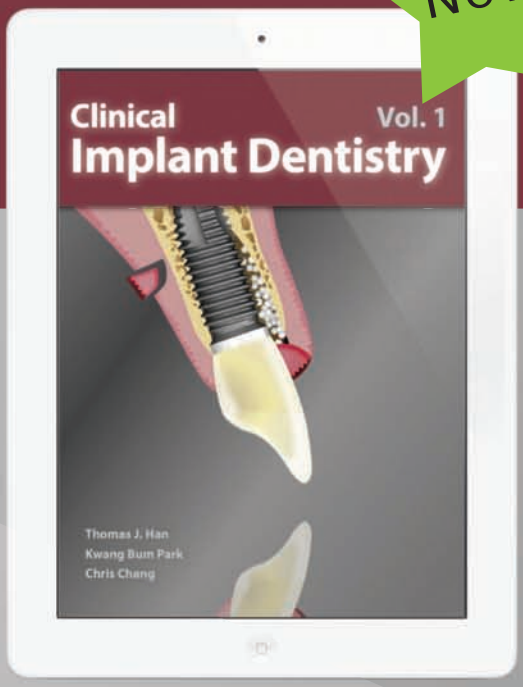

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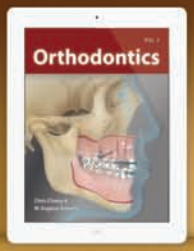

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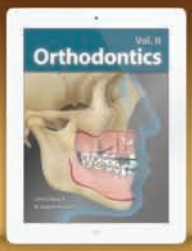

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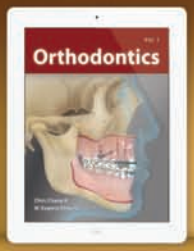

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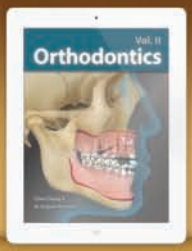

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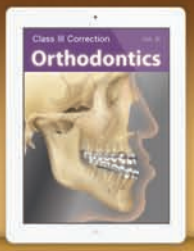

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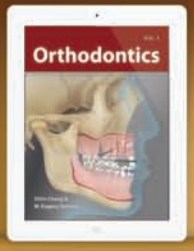

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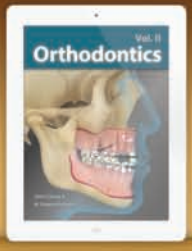

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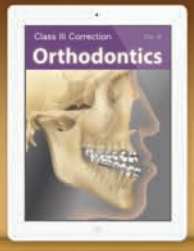

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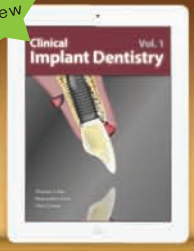

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蘋果科技在牙醫上的應用
Mac Technology Application in Dentistry

4/20(日) 21(一) 大會 高醫學術研究大樓
Workshop 高雄科工館

活動簡介

還在使用繁複過時的治療方式嗎？本次大會將顛覆你對牙醫科技的想像，一窺它的全新面貌。張慧男醫師再次突破窠臼、打破迷思，帶領您層層剖析艱難案例，從中發掘創新且簡易的治療技巧，發揮臨床上的最大效率。來自泰國的矯正及 Keynote 大師 Dr. Rungsi 將傳授新版 Keynote 在牙科運用上的優勢，並分享如何跨平台、跨裝置協助您的診間工作；第二天 Hands-on 實作課程讓您快速掌握 Keynote 技巧，成為牙科科技的先驅！

活動議程

04/20（日） 大會 高雄醫學大學 國際學術研究大樓 B2 （高雄市十全一路100號， 建議從同盟一路校門進入）	09:00～12:00	牙科的破壞性創新 Cutting-edge Orthodontics	張慧男 醫師
	14:00～17:00	蘋果科技在牙科上的應用 Mac Technology Application in Dentistry	Dr. Rungsi Thavarungkul
04/21（一） Workshop 國立科學工藝博物館 S103教室 （高雄市九如一路797號）	09:00～10:00	牙科諮詢跨時代的高效整合 Efficient and Effective Initial Consultation	張慧男 醫師
	10:00～17:00	Keynote 工作坊 – 快速掌握牙科新科技 Keynote Hands-on Workshop 1. 新版 Keynote 在牙科的運用優勢 2. 讓 Keynote 成為診間得力助手	Dr. Rungsi Thavarungkul

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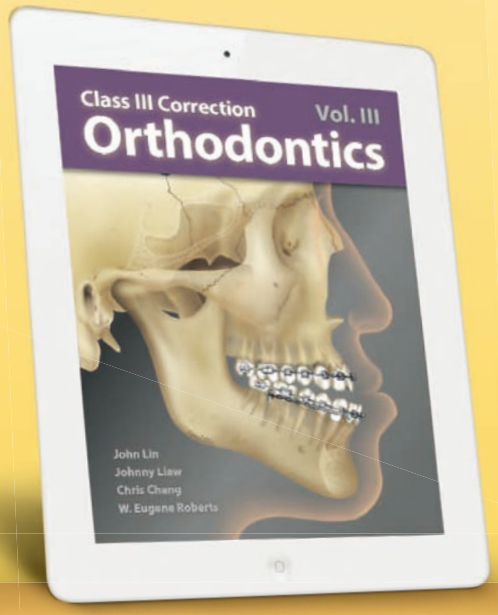

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Participants of Dr. Chris Chang's (center) first Damon workshop in Sanya, China on Oct. 16-17, 2013.

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