

NEWS & TRENDS IN ORTHODONTICS

July 1 Vol. 15 2009

Evidence-Based Damon System

Dr. John Lin

Simplifying and Improving Indirect Bonding

Dr. Larry White

ABO Objective Grading System

Dr. W. Eugene Roberts, Dr. James J. Baldwin and Dr. Frederick J. Regennitter

ABO Case Report : Impinging Overbite and Large Overjet Case

Dr. W. Eugene Roberts



Indiana Alumnae : (from left to right) Dr. Chris Chang, Dr. Charles J. Burstone, Dr. W. Eugene Roberts, Dr. James J. Baldwin at the 2009 109th AAO, Boston

iPod touch

矯正行動學習的最佳利器



Podcast Encyclopedia in Orthodontics 貝多芬矯正視訊百科全書 展示期間九折、原課程學員價七折



Beethoven Podcast Encyclopedia in Orthodontics

貝多芬矯正精修班有聲視訊課程系列

售價：14,300 元

A. 矯正基礎視訊課程十一大系列：		有聲系列	售價：14,300元
系列一：理想入門病例及矯正器黏著	系列七：維持及復發：持續微力的秘訣		
系列二：矯正療程四部曲	系列八：病例示範及診斷分析 (1)		
系列三：簡潔有效的錨定系統	系列九：病例示範及診斷分析 (2)		
系列四：不拔牙與拔牙分析	系列十：病例示範及診斷分析 (3)		
系列五：Damon 診斷流程及微調	系列十一：病例示範及診斷分析 (4)		
系列六：生物力學及完工檢測			
AD. 矯正進階視訊課程系列			售價：7,000元
VS. 初、進階植體視訊課程系列：		有聲系列	售價：2,600元
C. 助理視訊課程五大系列：			售價：5,000元
系列一：認識Damon器械 / 照相	系列四：取模 / 活動與固定維持器		
系列二：初診流程 / 療程說明 / X-ray	系列五：矯正螺絲/Damon Morph/衛教Keynote		
系列三：Bond 與相關衛教 / 辨認 Damon 線 / Damon 應對 Q & A			
備註：每年提供視訊課程更新資料只酌收工本費 連絡電話：03-5735676 黃思涵 網頁：www.newtonsa.com.tw			

Simplifying and Improving Indirect Bonding

Abstract

Indirect bonding offers orthodontic clinicians a superior technique for adhering brackets to teeth, but few of them use this method. The neglect of this procedure has many origins, e.g., expense, expertise necessary, inconsistent results, etc. This paper presents an indirect bonding system that orthodontists can use to expedite their bonding appointments and make them more pleasant for doctors and their patients.

Introduction

Although most orthodontic clinicians will admit that they can more accurately place brackets using an indirect bonding technique, fewer than 20% actually use this method routinely.¹ They offer several reasons for this choice: materials expense, required laboratory technique, training of personnel, and difficulty in achieving consistent and predictable bracket adhesion to the teeth plus other objections.

Many clinicians feel that insufficient pressure between the brackets and teeth cause the failure of brackets to adhere to teeth with the indirect method. Polyvinylsiloxane

and vacuum transfer trays often have excessive flexibility that prevent tight contact between brackets and teeth. Two previous articles^{2,3} described alternative indirect bonding methods that use a transfer tray made from a polymer of ethylene vinyl acetate applied with a hot-glue gun. This material has FDA approval and offers a non-toxic and non-carcinogenic material that has enough rigidity to keep the brackets opposed to the teeth, but also has enough flexibility to permit easy removal after polymerization of the composite. Women, who often work as laboratory technicians, will find the Surebonder DT 200 a preferable size with which to work. The glue gun uses mini-glue sticks and also comes with high heat, low heat or dual heat capacities (Figure 1). The low heat offers technicians the better alternative for controlling the flow of the liquid glue. A high temperature will produce bubbles and a molten matrix that technicians will find difficult to manage.

The indirect bonding system described here has the advantage of accuracy, certainty and allows doctors and staff to develop the confidence necessary to make indirect bonding a simple, predictable procedure.

Impression Technique

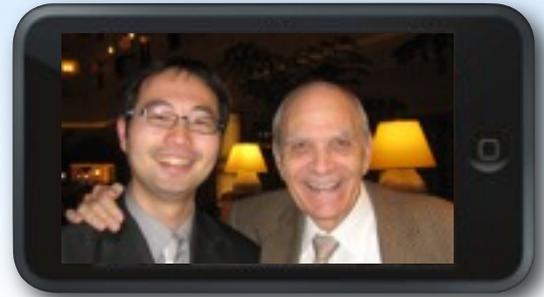
Doctors will wisely spend time at the first of treatment equilibrating teeth before taking impressions. This avoids having to guess where and how to compensate for chipped and damaged teeth when placing the brackets on the models. A good impression forms the basis of any successful indirect bonding technique. Although a polyvinylsiloxane impression offers the ultimate in fidelity reproduction, an alternative alginate impression technique has recently developed that rivals this more expensive gold standard for impressions – ImprEssix fast set alginate mixed in a TurboMax auto alginate mixer with cool water



Fig. 1 Surebonder DT-200 dual-temperature hot-glue gun.

Larry W. White, DDS, MSD (right)
Consultant of NTO

8018 Glen Albens Circle
Dallas, TX 75225 Phone 214 363 5447 Fax 214 363 0875
e-mail: larrywwhite@hotmail.com



(Figure 2) gives clinicians the most homogeneous, smooth mixture of alginate possible (Figures 3 & 4). Before making the impressions, make sure the teeth are clean and free of plaque. The best impressions result from a thick mix that resembles putty, but clinicians will need to vary the water and powder ratios for their own preferences. By using rigid trays of hard plastic or metal, clinicians can avoid the distortions that occur with softer disposable trays.

Integrating the Visualized Treatment Objective with Indirect Bonding

In order to position the brackets on the maxillary anteriors (canine to canine) so that the mouth displays a robust and pleasant smile arc, clinicians can use the Visualized Treatment Objective (VTO) to help them decide where to position the brackets for those teeth.

Burstone⁵ has suggested that the occlusal plane for adults should lie 3 mm inferior to the lip embrasure. However, when treating adolescents, clinicians should compensate for patient immaturity and place the occlusal plane 5-6 mm below the lip embrasure. This will allow a pleasant display of the teeth as the patient ages and the lips turn flaccid.

After the construction of the VTO occlusal plane, clinicians will need to reposition the maxillary and mandibular incisors anteroposteriorly and place the maxillary incisor exactly on the new occlusal plane. The mandibular incisor will extend one millimeter above the new occlusal plane and occlude with the lingual of the maxillary incisor. The VTO will ordinarily show that any bite opening will require intrusion of the mandibular incisors and for the maxillary incisors to stay in place vertically or extrude a small amount. If the VTO shows that the maxillary incisor should not move vertically, then

clinicians can place the bracket at the same level as the maxillary first premolar. If, on the other hand, the VTO displays a maxillary incisor that requires extrusion, then clinicians should move the bracket gingivally to achieve that goal. On rare occasions the VTO will suggest maxillary incisor intrusion, and this will require placing the bracket more incisally to attain that objective.

Opening the bite by intrusion of the maxillary incisors carries the risk of diminishing the smile as the patient ages and the upper lip begins to sag. By middle age these patients will barely show



Fig. 2 *TurboMax* alginate mixer.



Fig. 3 *Turbo-mixed* alginate.



Fig. 4 *Hand-mixed* alginate.

any teeth even when smiling largely. This contributes to a premature aging of the face and distracts from a youthful and pleasing appearance.

Figures 5 and 6 illustrate a patient whose VTO suggests no vertical change for the maxillary incisors but does recommend the lingual retraction of those teeth. Using the maxillary first premolar bracket slot as a guide for the maxillary incisor brackets achieved this goal. The bite opening needed for this patient will come entirely from intrusion of the mandibular incisors even as those teeth stay unmoved facial-lingually. Figure 7 displays the patient after her therapy with a robust smile and good occlusion.

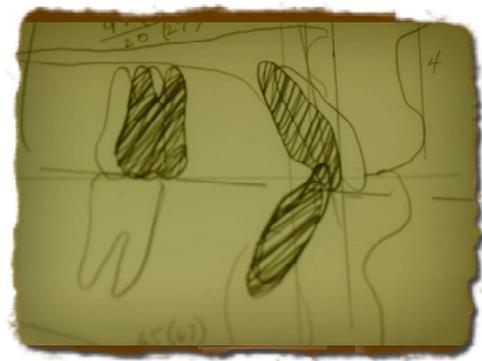


Fig. 6 VTO shows the maxillary incisor should retract but not move vertically. The mandibular incisor will not move horizontally but intrude slightly.



Fig. 5 Patient with a Class II malocclusion, maxillary and mandibular arch length discrepancies, large overjet and moderate overbite.



Fig. 7 Patient after therapy with two maxillary 1st premolars removed. Note the firm Class I occlusion, resolution of the overbite and overjet and the pleasing display of teeth when smiling.

The next patient in Figure 8 illustrates the peril of opening the bite by intrusion of the maxillary incisors. At the conclusion of treatment, this adolescent patient barely displays any teeth in her biggest smile. She has a Class I occlusion, but her smile has suffered and will continue to suffer as she ages because of the decision to intrude the maxillary incisors.

Model Preparation

A fast-set white stone with high compressive strength offers the best choice for model creation. After the stone has set, make sure the models have no defects before marking them for bracket placement. Use a fine-tip colored pencil to mark the models (.5 mm or smaller) since black lead markings sometimes transfer from the model to the teeth. Draw vertical lines that represent the long axes of the teeth. Follow these markings with a line that connects the mesial and distal marginal ridges of each tooth (Figures 9 and 10).

In the past, orthodontists have traditionally used measurements from the incisal edges and/or buccal occlusal cusp tips to the middle of the teeth. Since first molar cusps wear more than newly erupted premolars that strategy guarantees super-eruption of the molars during leveling of the arches. Alignment of the marginal ridges rather than cusp tips holds the key to good posterior occlusion. 4 Select a point on the first premolar for the position of the bracket slot and using an Ormco Boone Bracket Gauge with a colored lead tip (Ormco Corp., 1717 Collins Ave. Orange, CA 92867) or an ordinary Boone Gauge, make a mark and then draw a line parallel to that of the marginal ridge line of the first premolar (Figures 11 and 12). Using a compass with a lead point or one with two styluses, measure the distance from the first premolar marginal ridge line to the line representing the bracket slot and transfer that

measurement to all of the remaining posterior teeth (Figures 13 and 14).

Using the Ormco Boone Gauge or an ordinary Boone Gauge, transfer the measurement from the cusp tip of the first premolar to its slot line to the incisors. The maxillary lateral incisors should be a pencil width more incisally than the central incisors (.25 mm). The mandibular incisors should all have the same measurement. Mark the maxillary and mandibular canines about .75 mm more gingivally than the incisors (Figures 15 & 16).

After drawing all of the lines on the models, apply two coats of separating agent to the casts and let them dry. The laboratory technician can apply the brackets to the models after the separating liquid dries with a small amount Aleene's Tacky Glue (Aleene's, Buellton, CA). Aleene's is an inexpensive, water-soluble adhesive often used by

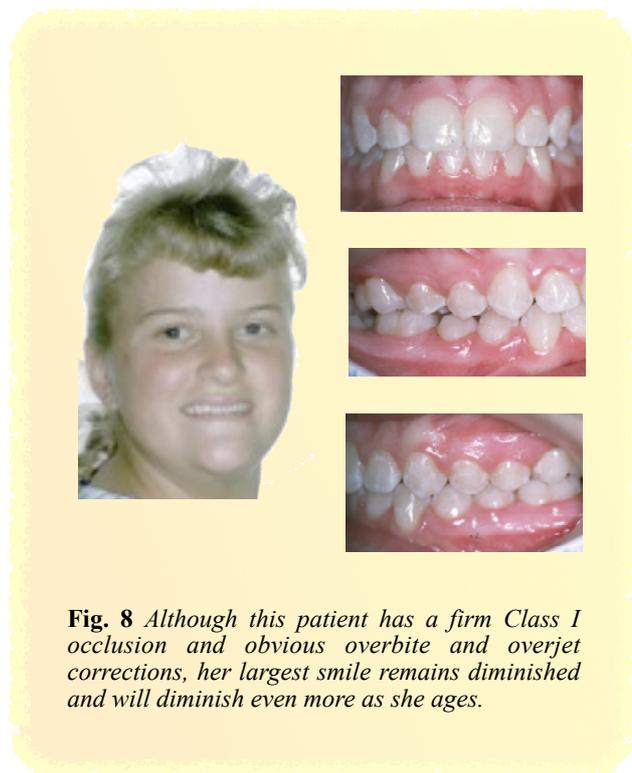


Fig. 8 Although this patient has a firm Class I occlusion and obvious overbite and overjet corrections, her largest smile remains diminished and will diminish even more as she ages.



Fig. 9 Axial lines drawn on model.

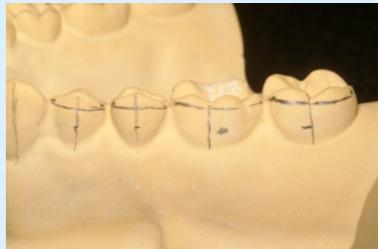


Fig. 13 Transferring slot lines to posterior teeth.



Fig. 10 Posterior marginal ridge lines.



Fig. 14 Parallel posterior slot lines.



Fig. 11 Marking slot position on first premolar with Boone Gauge.



Fig. 15 Transfer of premolar slot measurement to incisors.



Fig. 12 Transferring slot measurement to posterior teeth.



Fig. 16 Slot lines drawn on all teeth.

hobbyists (Figures 17 and 18). The glue sets rapidly and technicians will need to position the brackets quickly. Clinicians will need to review these brackets before having the transfer trays made, but they can make any changes by simply removing the brackets and adding more glue. The best device for placing brackets is a special bracket holding instrument that has several helpful features: one end has the bracket and tube holding pincers, while the other end has a mirror with and without a crosshair and a millimeter-marked probe. The probe can serve as an instrument to remove excess composite as well as measuring bracket height from the incisal edge. This bracket holder finds use either intraorally or in the laboratory (Figures 19 and 20).

Transfer Tray Fabrication

Before making the transfer trays with the molten glue, paint the brackets with mineral oil. This has proven the best lubricant for making it easier to remove the transfer trays after composite polymerization in the mouth (Figure 21).

Start the tray construction by applying the molten glue to the occlusal margins of the brackets, being careful not to extend the glue into the gingival tie wings. Such glue extension, while not completely detrimental, will make the tray more difficult to remove and can result in bracket fracture. Use the glue gun to form a molten matrix over the entire lingual and occlusal surfaces of the



Fig. 17
*Aleene's Tacky
Glue.*

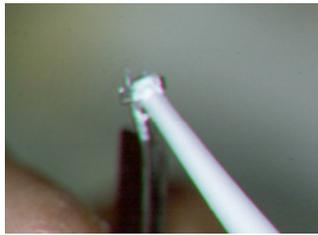


Fig. 18 *Applying Tacky Glue to
bracket.*

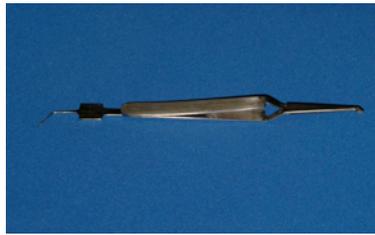


Fig. 19 *Dr. White's bracket holding
instrument.*



Fig. 20 *Intraoral use of people
for measuring bracket height
and removing composite.*

stone teeth and brackets. Add an additional amount of glue to the center of the brackets so as to add bulk to the part of the tray responsible for holding the brackets close to the teeth. Also, whenever possible, extend the trays distally one tooth beyond the last bracket or tube placed. This will help secure and stabilize the tray. The technician can smooth the surface of the tray by patting the softened glue with a wet finger. The wetness lubricates and protects the finger while it smoothes the glue before it hardens (Figure 22). After the glue hardens, submerge the trays and brackets in water for 30 – 60 minutes to dissolve the Tacky Glue and separate the transfer tray and brackets from the cast. Additional soaking of the separated trays will allow easy brushing away of the remaining cement with a soft-bristle brush. A

small ultrasonic denture cleaner offers an excellent additional method of removing any remaining Tacky Glue (Figure 23). Trim the excess hot glue from the transfer tray with scissors (Figure 24) and mark the midline with a magic marker. A microetcher will increase the surface area of the bracket mesh and subsequently increase the bond strength slightly,^{6,7} but technicians must exercise real care to remove all of the aluminum oxide powder from the bracket mesh, since leaving powder particles will weaken the bond strength (Figures 25).



Fig. 21 *Lubricating the brackets with
mineral oil prior to tray fabrication.*



Fig. 22 *Smoothing the hot glue tray
with a wet finger.*



Fig. 23 *Cleansing of tray in
ultrasonic solution.*





Fig. 24 *Trimming excess glue.*

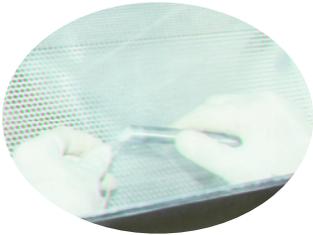


Fig. 25 *Microetching the bracket mesh.*

Clinical Application

If clinicians feel that the patients' teeth contain excessive concentration of fluoride, they should microetch the enamel before acid etching. Microetching alone has little clinical effect,⁸ but microetching followed by a chemical etch greatly enlarges the bondable surface area of fluorosed enamel⁹ (Figures 26, 27, 28, 29).

Hot glue transfer trays permit the use of multiple composites, e.g., auto-cure, light-cure, no mix, sealant combination, etc. However, clinicians may prefer to use light-cured composites because they achieve faster and more thorough polymerization than auto- cure materials,¹⁰ and as a rule environmental conditions such as heat and humidity do not disturb them. Clinicians should select all indirect bonding composites on the basis of flow as well as strength. Some of the more reliable light-cure materials are: Transbond™ (registered trademark of 3M Unitek 2724 S. Peck Road, Monrovia, CA 91916), Enlight™ (registered trademark of Ormco Corp., 1717 Collins Ave. Orange, CA 92867 or Light Cure™ (registered trademark of Reliance Orthodontic Product, P.O. Box 678, Itaska, IL 60143).

Chairside assistants should carefully load the bracket mesh of each bracket with a minute amount of light-cure composite and place them under an amber protective plate to prevent premature polymerization of the composite by ambient light (Figure 30). Composite flash remains the one large disadvantage of any indirect technique that uses flowable composite added directly to the

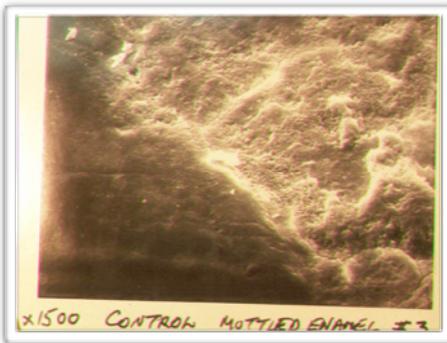


Fig. 26 *Fluorosed enamel surface.*

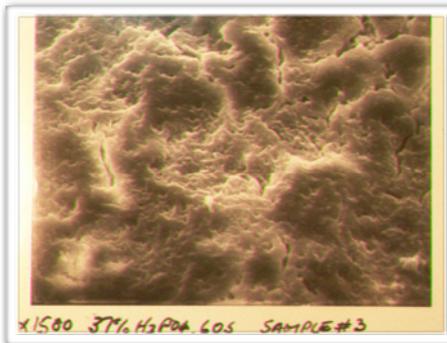


Fig. 27 *Fluorosed enamel after etching with 37% H₃PO₄.*

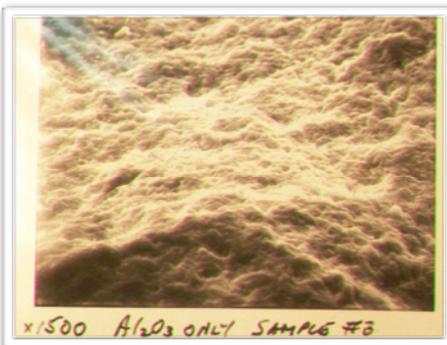


Fig. 28 *Fluorosed enamel after microetching.*

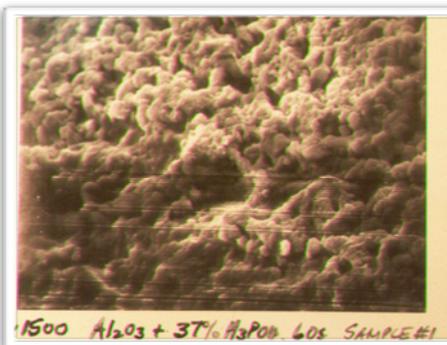


Fig. 29 *Fluorosed enamel after microetching and acid etch.*

mesh, so assistants need to diligently apply minimum amounts of composite to the bracket bases.

The doctor and assistants will clean the teeth and microetch them if necessary before isolating them with retractors, cotton rolls or triangular saliva absorbers. Although orthodontic clinicians can use a water-based, all-in-one adhesive, a recent study has shown that traditional etch and bond techniques offer stronger bond strengths.¹¹ After preparing the teeth with an etching technique, clinicians may prefer to dry them by using warm, dry air, particularly if the compressed air supply has oil and water in the lines (Figure 31).

Once clinicians have prepared the teeth with etching and sealants, they may place the tray in the mouth, using the midline mark on the transfer tray to guide the placement.

They should hold it with light pressure as they use a light source to cure the composite. Regular visible light curing units will ordinarily require 20 – 30 seconds of curing, and a Power Slot tip will require only 15 – 20 seconds of curing time. However, the new LED lights require only about 10 seconds/tooth (Figures 32 and 33).

Once the composite has cured, clinicians can easily remove the transfer tray with a Schure instrument, but if it

proves difficult, and they become fearful of breaking some brackets, the hot-air gun will soften the hot-glue sufficiently, and the tray will simply peel away from the brackets (Figures 34 and 35).

Clinicians can tie in an active wire immediately, or they may choose to place separators to prepare the molars for banding and use an annealed initial wire. Doctors should wait until after bonding before placing separators since their placement will move the teeth and the trays will not fit. Waiting to have any extractions done until after the indirect bonding is completed also avoids tooth movements that would render the trays inaccurate.



Fig. 30 Transfer trays with brackets protected from ambient light.



Fig. 31 Drying the teeth with warm, dry air.



Fig. 32 Power Slot tip from Reliance Company (Reliance Corp., P.O. Box 678, Itasca, IL)



Fig. 33 LED light from Reliance Company

Conclusion

Many orthodontists will prefer other methods of bracket placement, but this indirect method offers orthodontists a consistently reliable technique that has several advantages :

1. More accurate bracket placement.
2. More efficient use of clinical bonding time.
3. Maximizes assistant efficiency.
4. Cost effective.
5. Tighter adherence of brackets to the teeth.
6. Allows delegation of bonding duties.
7. Faster bonding appointments.
8. More patient comfort.
9. Frees up the schedule.
10. Shortens the learning curve of indirect bonding.

No clinical technique offers an unalloyed blessing, and clinicians will probably find some features of this indirect bonding method they will not like. But if they use this method for even a short time, they will discover a procedure that will make bonding more pleasant for them as well as their patients.

References

1. Gottlieb EL, Nelson AH, Vogels DS, 3rd. 1996 JCO Study of Orthodontic Diagnosis and treatment procedures. Part 2. Breakdowns of selected variables. *J Clin Orthod* 1996;30:689-698.
2. White LW. An expedited indirect bonding technique. *J. Clin. Orthod.* 2001;35:36-41.
3. White LW. A new and improved indirect bonding technique. *J. Clin. Orthod.* 1999;33:17-23.
4. Kalange JT. Ideal appliance placement with APC brackets and indirect bonding. *J. Clin. Orthod.* 1999;33:516-526.
5. Burstone CJ. Lip posture and its significance in treatment planning. *Am J Orthod* 1967;65:262-284.
6. Grabouski JKS, R.N.; Jakobsen, J.R. The effect of microetching on the bond strength of metal brackets when bonded to previously bonded teeth: an in vitro study. *Am. J. Orthod and Dentofacial Orthop.* 1998;114:452-460.
7. Leas TJ, Hondrum S. The effect of rebonding on the shear bond strength of orthodontic brackets-a comparison of two clinical techniques. *Am. J. Orthod.* 1993;103:200-201.
8. Olsen MEB, S.E.; Damon, P.; and Jakobsen, J.R. Comparison of shear bond strength and surface structure between conventional acid etching and air-abrasion of human enamel. *Am. J. Orthod.* 1997;112:502-506.
9. Miller RA. Bonding fluorosed teeth: new materials for old problems. *J. Clin. Orthod.* 1995;24:424-427.
10. Eliades T EG, et al.: Degree of Cure of Orthodontic Adhesives With Various Polymerization Initiation Modes. *Eur J Orthod* 2000;22:395-399.
11. Bishara SE, Vonwald L, Laffoon JF, Jakobsen JR. Effect of altering the type of enamel conditioner on the shear bond strength of a resin-reinforced glass ionomer adhesive. *Am J Orthod Dentofacial Orthop* 2000;118:288-294.



Fig. 34 Using a Schure instrument to remove the transfer tray.



Fig. 35 Softening the transfer tray with hot air.



I Love Orthodontics

熱愛矯正學 · 熱愛學矯正

快速入門矯正 · 高效學習法



學會開始做矯正需多久?

42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，每一步學習以圖片及影片教學，讓您很難錯失任何細節，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



矯正基礎

	台北	高雄	LECTURE	LAB
1	09/13/09	09/17/09	理想入門病例 + Damon 黏著	Bonding (D3MX) + BT
2	09/27	09/24	快速矯正療程四部曲	Ceph + Photo
3	11/01	10/15	簡捷有效的固定系統	Damon + OrthoBoneScrew I
4	11/15	10/22	不拔牙與拔牙分析	Damon + OrthoBoneScrew II
5	11/22	10/29	Damon 診斷流程及微調	Finish Bending
6	12/06	11/26	完工檢測及報告示範	Fixed Retainer (FR)
7	12/20	12/03	維持及復發：病例示範	Presentation Demo
8	12/27	12/10	矯正力學及診斷分析 (1)	DOX + Case Reports I
9	01/10/10	12/31	軟硬組織及診斷分析 (2)	DOX + Case Reports II
10	01/17	01/07/10	兒童矯正及診斷分析 (3)	DOX + Case Reports III
11	01/24	01/21	成人矯正及診斷分析 (4)	DOX + Case Reports IV



診所實習課表

1. Initial Consultation
2. Initial Record (Panor + Ceph + TMD + Photo + Model)
3. Final Consultation & Tx. Plan
4. Bonding & Banding (黏瓷牙、全牙、暫齒、埋伏牙、舌側維持器)
5. Archwire Adjustment & Bending
6. Retie & Power Chain & Clinical Tips
7. De-banding & De-bonding
8. Retainer (Removable & Fixed)
9. OrthoBoneScrew Implantation
10. Assistant Training & Patient Instrument Selection
11. Orthodontic Material & Instrument Selection
12. Practice Management & Office Design

矯正進階

	新竹	高雄
1	09/15/09	09/17/09
2	10/06	10/15
3	10/27	10/29
4	11/24	11/26
5	12/01	12/03
6	12/29	12/31
7	01/19/10	01/21/10
8	04/06	04/08
9	04/20	04/22
10	05/04	05/06
11	05/18	05/20

精修班

	新竹
1	05/12/09
2	06/09
3	07/21
4	08/18
5	09/08
6	10/13
7	11/03
8	12/15
9	01/12/10
10	02/09
11	03/09

International Workshop

• Keynote & management OrthoBoneScrew & Damon
 Group one 09/18 ~ 09/20/09 Group two 10/19 ~ 10/21/09

課程資訊

課程項目	時段	上課地點
矯正基礎	台北 / 高雄 【課程】09:00 - 12:00 【實習】另外安排	台北 恆逸資訊中心·華卡索廳 / 台北市復興北路99號12F (捷運南京東路站)
矯正進階	新竹【課程】09:00 - 12:00 高雄【課程】14:00 - 17:00	新竹 金牛頓藝術科技公司 / 新竹市建中一路25號2F
矯正植體 (含中、晚餐)	新竹【課程】09:00 - 12:00 【實習】13:30 - 20:00	高雄 科學工藝博物館S104教室 / 高雄市三民區九如一路720號
精修班	新竹【課程】09:00 - 12:00	
助理訓練班 (含中、晚餐)	新竹【課程】10:00 - 14:30 【實習】15:00 - 20:00	

助理訓練

第一梯	第二梯
08/21/09	10/23/09
08/28	10/30

矯正植體

新竹
09/25/09



講師 **張慧男** 博士
 新竹貝多芬齒顎矯正中心負責人
 美國印地安那普渡大學齒顎矯正研究所博士
 美國齒顎矯正專科醫師學院院士(ABO)

Quality Control in Daily Orthodontic Practice by Using the Objective Grading System

On a day to day basis most orthodontic practices are extremely busy. Achieving quality care with on time treatment goals is important. How can this be routinely done in daily practice? There are quality control instruments to be able to rapidly assess the progress and results for individual patients. One of the best, in my opinion, is the Objective Grading System, (OGS).

The OGS was developed by the American Board of Orthodontics (ABO) to quickly and reliably assess final dental casts and panoramic radiographs.^{1,2} Although there are several indexes to evaluate orthodontic outcomes such as the Peer Assessment Rating³ (PAR), the precision and convenience may be lacking. Once a clinician is familiar with the OGS metrics, chairside visual inspection can become a quick, simple and convenient way to establish a debonding checklist. The recommended form can be found at the ABO website.⁴

When measured on casts, a special ABO measuring ruler is required. The ABO OGS contains 7 scoring components for casts (alignment, marginal ridges, buccolingual inclination, occlusal relationships, occlusal contacts, overjet, and interproximal contacts) and 1 component for the panoramic x-ray. The sum of the 7 cast categories produces the total ABO score for a cast. According to Roberts⁵, a patient record with OGS scores 30 probably will fail the ABO test, and a score of 20 probably will pass.

Use of the OGS does not mean that the clinician can ignore up to date orthodontic knowledge and innovations. Nor can he ignore other aspects of smile attractiveness.⁶ But if clinicians use the OGS scoring system most will find it is easily to consistently obtain Board quality results and provide a better service to their patients.

- 1 Casco JS, Vaden JL, Kokich VG, Damone J, James R D, Cangialosi TJ, Riolo ML, Owens SE, Bills ED, Objective grading system for dental casts and panoramic radiographs American Journal of Orthodontics and Dentofacial Orthopedics, November 1998 - Volume 115 - Issue 5 - p 589 to p599.
- 2 James RD, Objective cast and panoramic radiograph grading system American Journal of Orthodontics and Dentofacial Orthopedics. November 2002 - Volume 122 - Number 5 - p450 to p450.
- 3 Richmond S, Shaw W, et al. The development of the PAR Index (Peer Assessment Rating): reliability and validity. Eur J Orthod. 1992; 14:125-39.
- 4 <http://www.americanboardortho.com/professionals/downloads/Grading%20System%20Casts-Radiographs.pdf>
- 5 Pulfer RM, Drake CT, Maupome G, Eckert GJ, Roberts WE.,The association of malocclusion complexity and orthodontic treatment outcomes. Angle Orthod. 2009; May 79(3):468-72.
- 6 Schabel BJ, McNamara JA, Baccetti T, Franchi L, Jamieson SA. The Relationship between Posttreatment Smile Esthetics and the ABO Objective Grading System. Angle Orthodontist: Vol. 78, No. 4, pp. 579–584.



Frederick J. Regennitter, D.D.S.
(Right)
Consultant
Division of Orthodontics
Vice Chair Dental Specialties
Assistant Professor of Dentistry
College of Medicine
MAYO Clinic



Objective Assessment of Orthodontics Clinical Outcomes

To objectively evaluate clinical case presentations, the American Board of Orthodontics (ABO) developed a series of methods for assessing malocclusion complexity and the quality of the treatment result.¹ Malocclusion complexity is determined with the Discrepancy Index (DI). From finish casts and panoramic radiographs, the finished occlusion is evaluated with the ABO Objective Grading System (OGS), which has been renamed the “Grading System for Casts and Panoramic Radiographs” on the ABO website.¹ The ABO Case Management Form (CMF) scores the treatment outcomes, relative to the clinician’s objectives, by assessing cephalometric tracings, measuring arch-widths on casts, and determining the overall quality of the case records. The DI, OGS and CMF methods are designed to determine if case records presented by a candidate meet the minimal standards of the ABO for certification purposes. Although the CMF has only been used for examination purposes, the DI and OGS have proven to be helpful for a variety of orthodontics outcome assessments.^{2,3,5,7-9,10-17}

The ABO case evaluation methods were not designed for comprehensive outcomes analysis, so they do not provide a thorough clinical assessment for quality assurance purposes. The Indiana University Comprehensive Clinical Assessment (CCA) method assesses additional factors related to overall clinical management : facial and dental esthetics, root resorption, arch-form symmetry, compliance (oral hygiene, keeping appointments and cooperation with mechanics), treatment efficiency (result vs. time in active appliances), periodontium preservation, and growth management.^{3,7-9,13,16}

Collectively, the ABO (DI, OGS) and the Indiana CCA methods are effective tools for quality assessment of clinical orthodontics.^{3,7-9,13-14,16} This article summarizes the methods and provides references for the detailed application of the techniques.

ABO Discrepancy Index

The Discrepancy Index (DI) method was introduced by the ABO in 2005.¹⁸ The method has been independently validated as an indicator of malocclusion complexity.^{3,7,12,14,16} A recent report by Pulfer et al.¹⁴ assessed the DI for 716 consecutive patients with permanent dentition and found it to be a reliable and relatively stable index for measuring malocclusion complexity; however, it is not a reliable predictor of outcomes.¹⁴ These data are a positive reflection on routine clinical standards

DISCREPANCY INDEX WORKSHEET		EXAM YEAR	DATE
CASE #	PATIENT	ABO ID#	
TOTAL D.I. SCORE			
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 OI (x-bite)	1 pt. per mm. per tooth =		
Total	=		
OVERBITE			
0 – 3 mm.	= 0 pts.		
3.1 – 5 mm.	= 2 pts.		
5.1 – 7 mm.	= 3 pts.		
Impinging (100%)	= 5 pts.		
Total	=		
ANTERIOR OPEN BITE			
0 mm. (edge-to-edge),	1 pt. per tooth		
then 1 pt. per additional full mm. per tooth			
Total	=		
LATERAL OPEN BITE			
2 pts. per mm. per tooth			
Total	=		
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	=		
OCCLUSION			
Class I to end on	= 0 pts.		
End on Class II or III	= 2 pts. per side	pts.	
Full Class II or III	= 4 pts. per side	pts.	
Beyond Class II or III	= 1 pt. per mm. additional	pts.	
Total	=		
LINGUAL POSTERIOR X-BITE			
1 pt. per tooth	Total =		
BUCCAL POSTERIOR X-BITE			
2 pts. per tooth	Total =		
CEPHALOMETRICS (See Instructions)			
ANB ≥ 6° or ≤ -2°	= 4 pts.		
Each degree < -2°	x 1 pt. =		
Each degree > 6°	x 1 pt. =		
SN-MP ≥ 38°	= 2 pts.		
Each degree > 38°	x 2 pts. =		
≤ 26°	= 1 pt.		
Each degree < 26°	x 1 pt. =		
1 to MP ≥ 99°	= 1 pt.		
Each degree > 99°	x 1 pt. =		
Total	=		
OTHER (See Instructions)			
Supernumerary teeth	x 1 pt. =		
Ankylosis of perm. teeth	x 2 pts. =		
Anomalous morphology	x 2 pts. =		
Impaction (except 3 rd molars)	x 2 pts. =		
Midline discrepancy (≥3mm)	@ 2 pts. =		
Missing teeth (except 3 rd 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. =		
Add. treatment complexities	x 2 pts. =		
Identify:			
Total	=		

Fig. 1 Discrepancy index worksheet

W. Eugene Roberts, DDS, PhD
 James J. Baldwin, DDS, MS
 Faculty, Department of Orthodontics,
 School of Dentistry Indiana University



because an optimal result was achieved for most patients regardless of the malocclusion complexity. On the other hand, the treatment duration is related to the DI, indicating it takes more time and effort to treat a complex malocclusion. Thus, the DI is an indicator of probable clinical effort that can be used as a guide for assigning fees for treatment that are fair to both the patient and the doctor. Figure 1 is the scoring form for the DI. Detailed instructions for scoring the complexity of a malocclusion with the DI method are available on the ABO website.¹

ABO Objective Grading System

The objective grading system (OGS) was introduced by the ABO in 19984 and was first used for the 1999 Phase III clinical examination. The OGS is part of the ABO effort to make the clinical examination a fair, accurate, and meaningful experience for examinees.¹ As previously mentioned, the ABO now refers to the OGS as the Grading System for Casts and Panoramic Radiographs, however, most outcomes references in the literature still refer it as the OGS.^{2-13,15-17} This objective method has helped to : 1. enhance the reliability of the ABO clinical examiners, 2. provide the candidates with a reliable tool for self-assessment of finished orthodontics results, and 3. assist candidates in selecting cases to present to the board examiners.¹

It is important for investigators to realize the OGS is an evolving method that is periodically revised to improve its performance as a clinical examination tool. There have been numerous major revisions related to variable dental anatomy and weighting of scores : 1. Marginal ridges - mesial marginal ridge of mandibular first premolars are not scored, 2. Maxillary cusps – neither diminutive distolingual cusps of maxillary molars nor lingual cups of maxillary first premolars are scored, 3. Mandibular occlusal contacts – no more than two points can be scored per tooth, and 4. Canine root angulation – omit scoring the canine root alignment because of inherent distortion in many radiographs.¹ Although a score of < 30 was originally considered to be potentially acceptable for board purposes,² these revisions in scoring have decreased the acceptable limit to 26 points.¹

The OGS is not a comprehensive outcome assessment for orthodontics treatment because it only scores casts and panoramic radiographs.^{1,4} However, independent clinical research has demonstrated that the OGS and Comprehensive Clinical Assessment (CCA) methods are complimentary, and

Fig. 2 Objective grading system form

their respective scores are positively correlated.^{8,9,13} These data indicate that when clinicians achieve an acceptable alignment of the dentition, as evidenced by an OGS score < 26 points,¹ they usually produce an optimal result from a more comprehensive perspective. This is an important validation of the OGS score for testing purposes, but it does not qualify the method as a comprehensive outcome assessment.

Over the years, numerous investigators have shown that the OGS method is both valid and reliable for routine scoring of clinical alignment.^{2,3,5,7-9,12,13,15-17} However, each use in clinical research must be specifically calibrated, because of sample variation, interexaminer error, and the progressive incorporation of refinements. It is not reliable to compare scores that were derived using different variations of the method. Comparable scores require a specific calibration based on a specific stage of refinement of the OGS method.

Figure 2 is the current OGS form for scoring orthodontic alignment, utilizing casts and panoramic radiographs; an original can be downloaded from the ABO website.¹ The ABO designed a special tool (gauge) for measuring overjet, marginal ridge discrepancies, lack of cusp contact, as well as axial inclination of premolars and molars. The gauge can be purchased from the ABO or custom manufactured according to the specifications shown in Figure 3. Complete details for the OGS method and

use of the gauge are provided by a link to Grading System for Casts and Panoramic Radiographs on the ABO website.¹ A new interactive series of forms is now available for all aspects of the ABO case workup, including the DI, OGS and CMF.¹

Comprehensive Clinical Assessment (CCA)

Orthodontics faculty at Indiana University developed the CCA method to supplement OGS scores for use as a comprehensive assessment of clinical outcomes for a

consecutive series of orthodontics patients.^{8,13} Relative to the OGS scoring of casts and panoramic radiographs, the CCA method assesses additional factors related to overall clinical performance: facial and dental esthetics, root resorption, arch-form symmetry, compliance (oral hygiene, keeping appointments and cooperation with mechanics), treatment efficiency (result vs. time

in active appliances), periodontium preservation, and growth management. This article is the first publication of the most recent revision of the CCA method. The current scoring criteria and data-entry form for the CCA method is shown in Page 16. Although OGS and CCA scores have proven to be positively correlated, the use of both methods provides the most reliable comprehensive outcome assessment for routine orthodontics treatment.^{3,7-9,13,16}

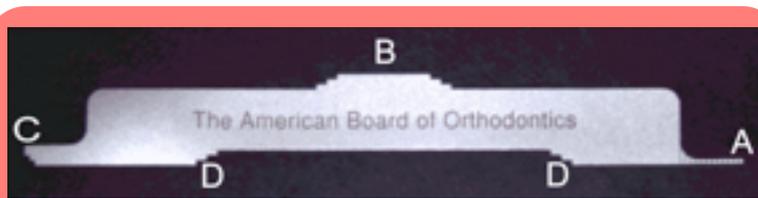


Fig. 3

- A. The right aspect of the gauge is used to measure 1 mm increments relative to discrepancies in alignment, overjet, occlusal contact, interproximal contact, and occlusal relationships. The width of this gauge extension is 0.5 mm.
- B. The superior surface of the gauge has graduated steps measuring 1 mm in height and is used to assess discrepancies in mandibular posterior buccolingual inclination (3rd order alignment).
- C. The left aspect of the gauge has graduated steps measuring 1 mm in height and is used to evaluate discrepancies in marginal ridges.
- D. The inferior surface of the gauge has graduated indentations of 1mm each which are used to evaluate discrepancies in maxillary posterior buccolingual inclination (3rd order alignment).

Conclusions

- OGS method has evolved into a reliable and efficient assessment of the finished orthodontic alignment.
- DI has proven to be an effective indicator of malocclusion complexity (severity) for a wide variety of patients.
- DI can be used as a guide for determining a fair fee based on probable clinical effort.
- CCA method evaluates a broader array of clinical outcomes such as esthetics, root resorption, symmetry, compliance, treatment efficiency, periodontium preservation, and growth management.
- Collectively, the DI, OGS and CCA methods provide a reliable assessment of orthodontics clinical outcomes relative to malocclusion severity.
- Routine outcome assessments are essential for establishing and maintaining quality control in an orthodontics practice.

References

1. American Board of Orthodontics Website: <http://www.americanboardortho.com>, accessed July22, 2009.
2. Abei Y, Nelson S, Amberman BD, Hans MG. Comparing orthodontic treatment outcome between orthodontists and general dentists with the ABO index. *Am J Orthod Dentofacial Orthop* 2004;126:544-548.
3. Campbell CL, Roberts WE, Hartsfield JK, Jr., Qi R. Treatment outcomes in a graduate orthodontic clinic for cases defined by the American Board of Orthodontics malocclusion categories. *Am J Orthod Dentofacial Orthop* 2007;132:822-829.
4. Casco JS, Vaden JL, Kokich VG, Damone J, James RD, Cangialosi TJ et al. Objective grading system for dental casts and panoramic radiographs. American Board of Orthodontics. *Am J Orthod Dentofacial Orthop* 1998;114:589-599.
5. Cook DR, Harris EF, Vaden JL. Comparison of university and private-practice orthodontic treatment outcomes with the American Board of Orthodontics objective grading system. *Am J Orthod Dentofacial Orthop* 2005;127:707-712.
6. Costalos PA, Sarraf K, Cangialosi TJ, Efstratiadis S. Evaluation of the accuracy of digital model analysis for the American Board of Orthodontics objective grading system for dental casts. *Am J Orthod Dentofacial Orthop* 2005;128:624-629.
7. Deguchi T, Honjo T, Fukunaga T, Miyawaki S, Roberts WE, Takano-Yamamoto T. Clinical assessment of orthodontic outcomes with the peer assessment rating, discrepancy index, objective grading system, and comprehensive clinical assessment. *Am J Orthod Dentofacial Orthop* 2005;127:434-443.
8. Hsieh TJ, Pinskaya Y, Roberts WE. Assessment of orthodontic treatment outcomes: early treatment versus late treatment. *Angle Orthod* 2005;75:162-170.
9. Knierim K, Roberts WE, Hartsfield J, Jr. Assessing treatment outcomes for a graduate orthodontics program: follow-up study for the classes of 2001-2003. *Am J Orthod Dentofacial Orthop* 2006;130:648-655, 655 e641-643.
10. Murakami K, Deguchi T, Hashimoto T, Imai M, Miyawaki S, Takano-Yamamoto T. Need for training sessions for orthodontists in the use of the American Board of Orthodontics objective grading system. *Am J Orthod Dentofacial Orthop* 2007;132:427 e421-426.
11. Nett BC, Huang GJ. Long-term posttreatment changes measured by the American Board of Orthodontics objective grading system. *Am J Orthod Dentofacial Orthop* 2005;127:444-450; quiz 516.
12. Park Y, Hartsfield JK, Katona TR, Eugene Roberts W. Tooth positioner effects on occlusal contacts and treatment outcomes. *Angle Orthod* 2008;78:1050-1056.
13. Pinskaya YB, Hsieh TJ, Roberts WE, Hartsfield JK. Comprehensive clinical evaluation as an outcome assessment for a graduate orthodontics program. *Am J Orthod Dentofacial Orthop* 2004;126:533-543.
14. Pulfer RM, Drake CT, Maupome G, Eckert GJ, Roberts WE. The association of malocclusion complexity and orthodontic treatment outcomes. *Angle Orthod* 2009;79:468-472.
15. Schabel BJ, McNamara JA, Baccetti T, Franchi L, Jamieson SA. The relationship between posttreatment smile esthetics and the ABO Objective Grading System. *Angle Orthod* 2008;78:579-584.
16. Vu CQ, Roberts WE, Hartsfield JK, Jr., Ofner S. Treatment complexity index for assessing the relationship of treatment duration and outcomes in a graduate orthodontics clinic. *Am J Orthod Dentofacial Orthop* 2008;133:9 e1-13.
17. Wes Fleming J, Buschang PH, Kim KB, Oliver DR. Posttreatment occlusal variability among angle Class I nonextraction patients. *Angle Orthod* 2008;78:625-630.
18. Riolo, M. L., S. E. Owens, et al. (2005). "ABO resident clinical outcomes study: case complexity as measured by the discrepancy index." *Am J Orthod Dentofacial Orthop* 127(2): 161-3.

CCA Scoring Criteria – no more than 5 points scored for each category

1. **Compliance** : Failures, Poor Oral Hygiene, Tx Cooperation (5)_____
 - (1 pt for every 2 notes per category up to maximum of 5)
2. **Records Quality** : (5)_____
 - Number of **A** or **B** records missing or of poor quality (1-5)
3. **Facial Esthetics** : (5)_____
 - Frontal Symmetry : no improvement or deterioration (1-2)
 - Profile : no improvement or deterioration from ideal (1-2)
 - Smile Line : no improvement or deterioration (1-2)
4. **Dental Esthetics** : (5)_____
 - Enamel Surfaces : residual bonding resin or enamel scars (1-2)
 - Dentition : embrasures, incisal edges, black triangles & corridors(1-2)
 - Decalcifications : moderate to severe (1-2)
5. **Vertical Control** : (5)_____
 - Growth Management : no improvement or deterioration (1-2)
 - Lip Competence : no improvement or deterioration (1-2)
 - Incisal Exposure : no improvement or deterioration (1-2)
6. **Arch-Forms** : (5)_____
 - Symmetric : moderate to marked discrepancy (1-2)
 - Coordinated : moderate to marked Mx/Mn discrepancy (1-2)
 - Dentition over Basilar Bone : to tonsillar pillars and apical base (1-2)
7. **Periodontium Management** : (5)_____
 - Bone Loss : moderate to severe, localized or generalized (1-2)
 - Recession : moderate to severe, localized or generalized (1-2)
 - Gingival Clefts : moderate to severe, localized or generalized (1-2)
 - Gingivitis : moderate to severe (1-2)
8. **Root Structure Preservation** : root resorption (5)_____
 - Incisors : moderate to severe, localized or generalized (1-2)
 - Cuspids, Bicuspid : moderate to severe, localized or generalized (1-2)
 - Molars : moderate to severe, localized or generalized (1-2)
9. **Treatment Efficiency** : result attained relative to treatment time (5)_____
 - Overall Result : moderate to severe compromise (1-2)
 - Exceeds Expected Tx Time : one point per 6 mo. increment (3)

TOTAL_____

The Dream Screw for Next Generation's Orthodontists

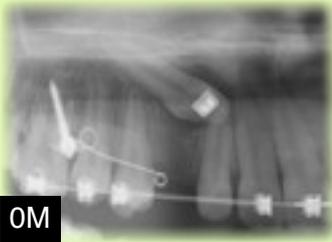
OrthoBoneScrew

OrthoBoneScrew (OBS) has a double-crossed rectangular slot on its neck. This 0.018 by 0.025 inches rectangular slot provides versatile use of orthodontic mechanics. A wire size of 0.017 by 0.025 inches dimensions can be secured in the slot firmly.

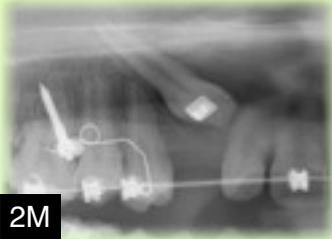
A case report demonstrating a 3D control of impacted tooth

Mechanics design:

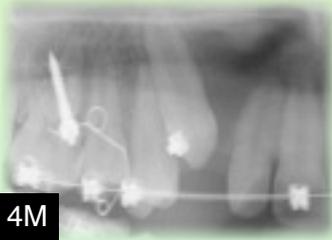
A 0.017 x 0.025-inch TMA lever arm was consisted of a helical coil on one end and helical attachment on the other end. When this lever arm was inserted in the square hole in the OrthoBoneScrew (located at infrazygomatic crest) and activated, it could build a force system which distalized the canine first, then moved buccally slightly, and finally downward to the reserved canine space. If the mechanics were designed to exert force directly from the main arch wire, it would have been detrimental to the roots of the incisors. During the follow-up visits, the helix was adjusted without taking it out. After four months, the impacted canine was successfully moved away from the previously impacted site and was ready for bracket bonding.



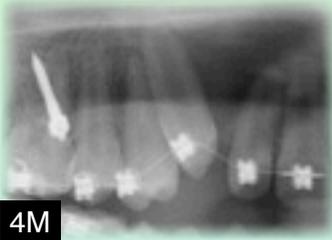
0M



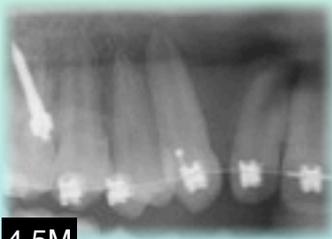
2M



4M



4M

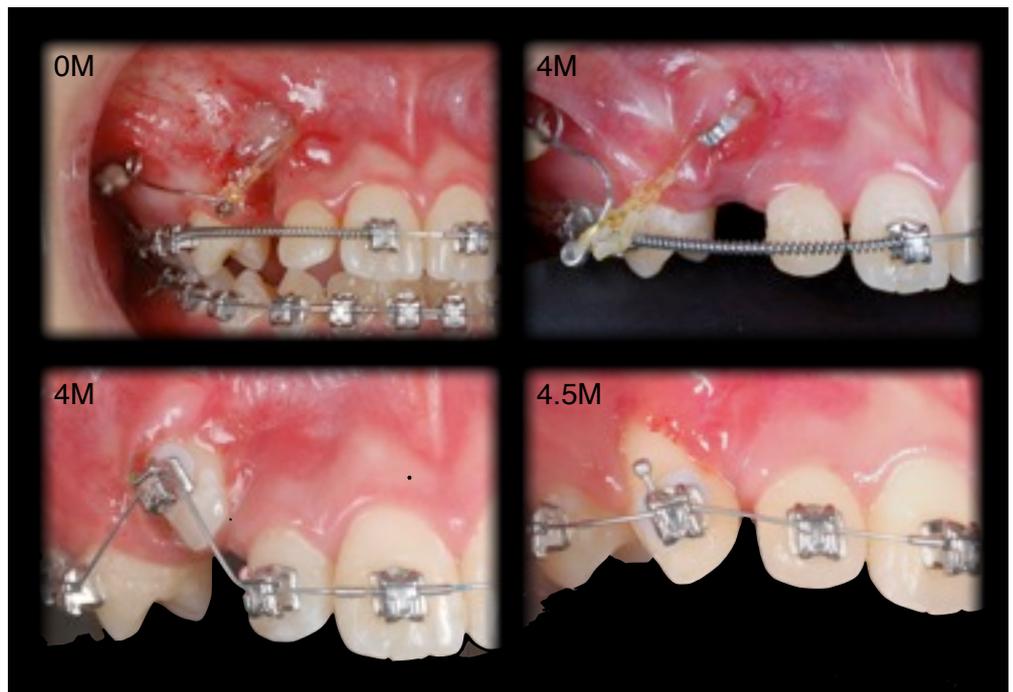


4.5M

OrthoBoneScrew

Corporate Headquarters
2F, No. 25, Jian-Jhong First
Road, Hsinchu, Taiwan 300
Tel: +886 3 5735676
Fax: +886 3 5736777

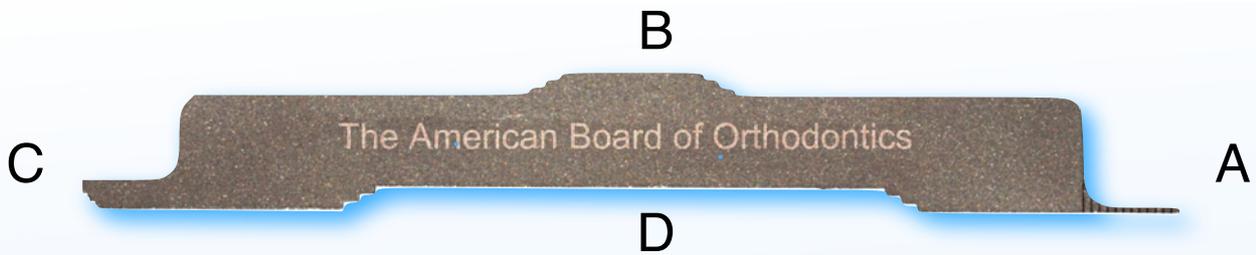
Contact: info@orthobonescrew.com



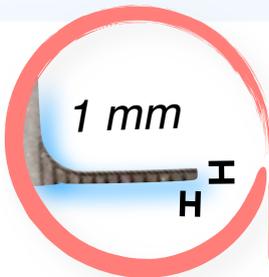
如何使用 ABO Measuring Gauge

美國矯正專科審查醫學會為了要讓 ABO 第三階段臨床考試更加客觀公平，歷經數年研究，設計出審查專用測量工具 ABO measuring gauge，不只讓審查醫師有統一的審查標準，考生也能在提出審查病例前，先自行檢查是否符合審查資格，修正錯誤或重新提出符合審查標準的案例。

對於一般醫師而言，可以利用 ABO measuring gauge，檢視矯正患者治療中或治療後的狀況，最好能在矯正治療結束前先印模檢視，了解自己做的不夠好的地方並改正它，最後再自我檢測矯正完成的結果是否符合標準，以提升矯正治療品質。



A: Alignment、Overjet、Occlusal contact、Interproximal contact、Occlusal relationships
 B: Md. B-L inclination C: Marginal ridge D: Mx. B-L inclination



ABO measuring gauge 每個部位都有其特殊用法，它的厚度是 0.5 mm，每一個 step 的高度或刻度都是 1 mm。



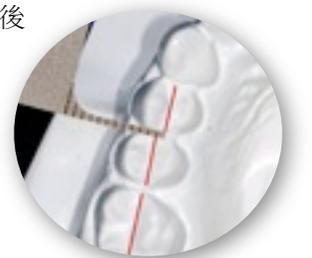
每個刻度是 1 mm，寬度也是 1 mm，用來測量 Alignment、Overjet、Occlusal contact、Interproximal contact、Occlusal relationships 這些項目。

Alignment :

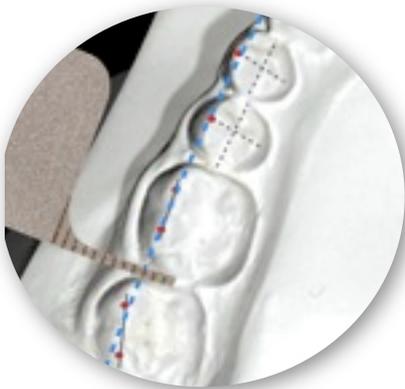
上顎前牙區的 incisal edges 與 lingual surfaces 必須排列成為一條平滑曲線，下顎前牙區的 incisal edges 與 labial surfaces 必須排列成為一條平滑曲線。測量時在排列不整齊處、測量與相鄰牙齒理想 contact 位置的差異量，相差 0.5 mm 以上就應該扣分且需要改正。



上顎後牙區 central groove 的排列必須成為一條平滑線條。測量時若不易辨別，可先在後牙咬合面畫出 central groove 位置並延伸至 marginal ridge 上，就可清楚看出與相鄰牙齒的排列是否適當。在排列不整齊處、測量與相鄰牙齒理想 contact 位置的差異量，或直接測量與鄰牙 central groove 的差異量，相差 0.5 mm 以上就應該扣分且需要改正。



蔡鑑隆 醫師
誠品、長春牙醫診所
貝多芬矯正課程講師



下顎後牙區 buccal cusps 的排列必須成為一條平滑線條，才能與上顎 central groove 相互對應，包括 premolars 的 buccal cusps 及 molars 的 mesiobuccal cusps 與 distobuccal cusps。有時 premolar 外形變異較大，很難從單一個 buccal cusp 直接看出排列問題，可先用鉛筆畫出 premolar 咬合面的頰舌連線與近遠心連線，即可清楚看出與相鄰牙齒是否有排列差異或 rotation 的問題。Molars 可以直接從 mesiobuccal cusps 與 distobuccal cusps 連線看出，或用鉛筆畫出 cusps 連線，即可清楚看出與相鄰牙齒排列是否有差異，在排列不整齊處，測量與相鄰牙齒理想 contact 位置的差異量，相差 0.5 mm 以上就應該扣分且需要改正。

Overjet :

檢查上下顎牙齒的 buccal lingual relationships 正不正確，前牙部份，下顎前牙必須與上顎前牙互相接觸，沒接觸者必須扣分且需要改正。Open contact 1 mm 之內扣一分，大於 1 mm 以上扣 2 分。ABO measuring gauge A 端寬度剛好 1 mm，只要寬的那部份放的進去，代表 open contact 大於 1 mm 以上必須扣 2 分，放不進去代表小於 1 mm 只扣一分。

至於後牙部份，上顎 lingual cusps 與下顎 buccal cusps 必須咬在對咬牙的 fossa，只要有 buccal lingual 方向的偏移就要扣分且需要改正，測量時可由側方或後方傾斜一角度觀察與測量。



Occlusal Contact :

檢查後牙咬合是否確實緊密接觸，所有後牙的 functional cusps，上顎的 lingual cusps 與下顎的 buccal cusps，必須與對咬牙互相接觸。上顎部份，除了 1st premolar 的 lingual cusps，因為對咬牙外形變異性大，不予以計分。上顎 molar 的 distolingual cusps 若不明顯也不記分。測量時可由舌側檢查上顎的 lingual cusps，若有 open contact 開始扣分，小於 1 mm 扣一分、大於 1 mm 扣兩分。gauge A 端寬度 1 mm，放不的進去扣一分，放的進去扣兩分。

下顎後牙包括 premolar 的 buccal cusps、molar 的 mesiobuccal cusps、distobuccal cusps 都要記分。測量時由頰側觀察、測量方式與上顎相同。

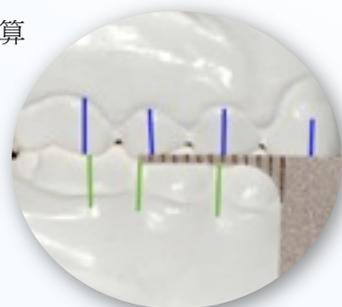


Interproximal Contact :

所有牙齒必須與相鄰牙齒緊密接觸，有 open contact 大於 0.5 mm 時開始扣分且需要改正。測量時可利用 gauge A 端厚度 0.5 mm 來檢驗，只要 gauge 厚度放的進 interproximal space，代表大於 0.5 mm 扣一分，若 gauge A 端寬度放的進 interproximal space，代表大於 1 mm 以上扣兩分。

Occlusal Relationships :

檢查上下顎齒列的前後位置正不正確。若 finish 在 Class I 的咬合關係，上顎 1st molar 的 mesiobuccal cusp 咬在距離下顎 1st molar 的 buccal groove 前後 1 mm 以內的範圍都算 Class I；canine、premolar、molar 的 buccal cusps，咬在距離對咬牙 embrasure 前後 1 mm 以內的範圍都算 Class I。Class II、Class III 與 Class I 類似，差別在 molar 位置不同。測量時先正對模型頰側面避免視角誤差，前後位置差異超過 1 mm 以上就要扣分。可先畫出上顎 buccal cusps tips 與 axis，下顎標出 embrasure 位置，即可清楚測量，超過範圍就要開始扣分且需要改正。



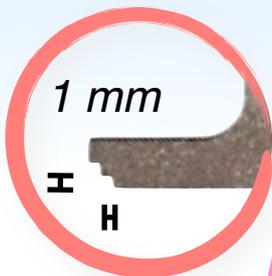
每個 step 高度 1 mm，用來測量 mandibular buccolingual inclination。

Mandibular Buccolingual inclination :

檢查 buccal lingual angulation 正不正確。下顎後牙區的 buccal cusp 與 lingual cusp 幾乎等高，或 buccal cusp 比 lingual cusp 高一點。一般高度差在 1 mm 以內是可被容許的，若超過 1 mm 以上就須扣分且需要改正。

測量時將 ABO measuring gauge 放在測量牙齒的 buccal cusp 上，另一端最好跨於同名牙齒的相同位置上，以最接近或平行咬合平面的方式觀察 buccal cusp 與 lingual cusp 高度差，若對側牙缺失或外型差異太大者可移至鄰近牙齒上。





每個 step 高度 1 mm，用來測量 marginal ridge。

Marginal Ridge :

檢查牙齒垂直位置正不正確。後牙區相鄰牙齒的 marginal ridge 必須等高或差距小於 0.5 mm，若有明顯差異大於 0.5 mm 就須扣分且需要改正。測量時利用 gauge C 端測量，將 gauge C 端放在較低的 marginal ridge 上，若高度落差超過半個刻度 (0.5 mm) 以上時就須扣分且需要改正。下顎 1st premolar 因外型變異性大與 2nd premolar 的 marginal ridge 高度差異不予計分。



每個 step 高度 1 mm，用來測量 maxillary buccolingual inclination。

Maxillary Buccolingual inclination :

檢查 buccal lingual angulation 正不正確。上顎後牙區的 buccal cusp 與 lingual cusp 應接近等高或 lingual cusp 比 buccal cusp 高一點，一般高度差在 1 mm 以內是可被容許的，若超過 1 mm 以上就須扣分且需要改正。上顎 2nd molar 容許較大的差異量，但若 buccal cusp 與 lingual cusp 的高度差超過 2 mm 以上就須扣分。

測量時先將上顎模型倒過來，將 ABO measuring gauge 放於測量牙齒的 lingual cusp 上，另一端最好跨於同名牙齒的相同位置上，以最接近或平行咬合平面的方式觀察 buccal cusp 與 lingual cusp 高度差，若對側牙缺失或外型差異太大者可移至鄰近牙齒上。



Conclusion :

提升矯正效率與品質的最好方法是：一開始就做正確的事，包含正確的診斷與適當的治療計畫，使用最熟悉且高效率矯正系統，矯正器黏在正確的位置，充分了解使用的 mechanism 等。另外使用 ABO measuring gauge 來幫忙了解自己常犯的錯誤並及時改正，也能提升矯正效率與品質。最好在進入 finish 階段時，取參考模型與拍 pano X 光片，配合 ABO measuring gauge，徹底檢視哪裡做不夠好需要改正，盡可能一次改善所有問題，並減少再犯錯的機會，才能提供患者最好的矯正治療。

References :

1. Casco JF, et al: Objective grading system for dental casts and panoramic radiograph. Am J Orthod Dentofacial Orthop 1998;114:589-599
2. Chang CHN. Beethoven Podcast Encyclopedia in Orthodontics.2008; Newtons' A Ltd,Taiwan



My AAO Debut

Boston, a vibrant city, hosted the 109th annual session of the American Association of Orthodontists (AAO) from May 1st to 5th, 2009. I was lucky enough to be invited to participate in three events, playing in the AAOF Benefit Golf Tournament, displaying three of my ABO Board cases and giving a presentation on using screws to treat impacted cuspids. This trip turned out to be the most precious experience in my professional life so far.

Thanks to the arrangement by Mr. Don Tuttle, I had the chance to play with Dr. Mike Mayhew, a legendary golfer in the orthodontic circle. It was a bliss to play in The International, a beautiful golf course designed by Robert Trent Jones. What a wonderful afternoon to enjoy the game of golf with good friends! You simply cannot ask for more. At the end I was so surprised to receive the Net Champion and the longest drive award with an astonishing hit of 385 yards. As a first-timer playing in the AAOF, that felt amazing. I will treasure that moment for the rest of my life.

For the past 23 years, it had always been my dream to become an ABO certified orthodontist. That dream finally came true early this year in Dallas. The ABO board exam is not easy at all, especially for Asians who are not practicing in USA, besides the obvious language barriers. Thanks to my mentor, Dr. Eugene Roberts, who had worked so hard to make sure that I was on the right track with exam preparation. After the exam, I was invited to display three of my Board cases. It was a great learning experience. I had the chance to talk with people who were unfamiliar with my method and we exchanged thoughts on various approaches. At the end of the display session, Dr. Roberts and myself came to a conclusion that it might be a good idea to write out those Board cases and publish them in NTO. This way people will have a chance to understand in great depth our methods and the essential steps of preparing for this Exam. This idea was echoed by my ABO examiner, Dr. Frederick Regennitter (page 21).

The last assignment of this trip was to present my favorite topic on Impacted Cuspids at AAO. The AAO Annual Session is undoubtedly the most prestigious stage in our profession. It was my first time to be on this stage. Early this year I had a chance to rehearse my materials in the Asian Damon Forum in Bangkok. After the lecture, I asked my speech coach, Ms. Sandra Diver for advices. Her answer was plain and simple: **"Every word you say has to be heard"**. What a great advice! It simply hits the core of every good presentation. In the AAO program I was scheduled to speak on the afternoon of May 4th. So I had two and half days to study other speakers' performances before my turn. I was hoping I could learn some tips from them. If we were to divide speakers into two groups, there were simply the good ones and bad ones. Good speakers master a practice that is simple but powerful. They speak more slowly than usual. Generally speaking most speakers have a lot to say and only a short time in which to say it. The natural tendency is to try to pack in as much as they can. However, a good speech is not about the number of things we say. Rather, it's about the number of things that are understood. That is why ordinary speakers lose the audiences right from the beginning and become bad speakers.

The faster you speak, the less people will understand you. I took that lesson to heart and really paced myself in my presentation. At the end of my lecture people came up to greet me. Among various generous feedback they gave me, there was one piece of comment that I would not forget in my life. The computer engineer came to my seat and said, Chris, you're the best speaker so far! When I looked into his eyes, I knew that he was speaking from the bottom of his heart. This gentleman had sat there for the past three days and recorded everything that he had no idea nor interest whatsoever. He made that comment by his observation of the crowd. Understandably similar comments were also expressed in the AAO presentation evaluation form (page 55). Ms. Sandra's advice that **"Every word you say has to be heard"** has once again been proved to be true and the 95% favorable responses to my presentation from the AAO evaluation can certainly attest to that.

Chris HN Chang, DDS, PhD, Publisher

03 Editorial

LIVE FROM THE MASTER

- 04 Evidence-Based Damon System - Part I, Extraction vs. Non-extraction and Retention
- 12 Simplifying and Improving Indirect Bonding
- 21 Quality Control in Daily Orthodontic Practice by Using the Objective Grading System
- 22 Objective Assessment of Orthodontic Clinical Outcome

FEATURE

- 28 How to Use ABO Measuring Gauge
- 24 10 Facts You Need to Know About Root Resorption
- 36 Interdisciplinary Treatment Part I
- 42 Esthetic Considerations in Orthodontic Treatment for Gummy Smile - A Protrusion Case

ABO CASE REPORT

- 48 An Impinging Overbite and Large Overjet Case
- 56 A Class II Deep Bite Case

PERSPECTIVES

- 64 Dr. Charles J. Burstone on Biomechanics of TAD

VOICES FROM THE ORTHODONTIC WORLD

- 68 Feedback on International OrthoBoneScrew and Damon Workshop



Consultant
Dr. W. Eugene Roberts



Consultant
Dr. Larry White



Guest Editor
Dr. Rungsi Thavarungkul



Contributors (from left to right) :
Dr. Hong Po Chang, Consultant
Dr. Ming Guey Tseng, Consultant
Dr. John Lin, Consultant
Dr. Frank Chang, Consultant
Dr. Johnny Liao, Consultant
Dr. Chris Chang, Publisher



Editors (from left to right) :
Tzu Han Huang, Associate Editor
Billy Su, Chief Editor
Yu Lin Hsu, Associate Editor

10 Facts You Need to Know About Root Resorption

— Summary of Dr. Kokich's farewell lecture in Taiwan —

Dr. Kokich 在演講中提出十個關於矯正病人面對牙根吸收時我們所可能碰到的疑問，以下為 Dr. Kokich 的演講重點摘要：

1. 有多少比例的矯正病人會出現牙根吸收？

從 Dr. Owman 等人¹ 在 1995 年的研究中，針對 144 位成年人施以 50 gm 的力量在小白齒上一段時間後然後再將該小白齒拔除 (Fig 1.)，放到顯微鏡底下觀察後，發現有約 93 % 的比例會出現牙根吸收的狀況，也說明了矯正施力過程中，牙根的吸收是普遍的情形。

2. 什麼造成牙根吸收？

Dr. Ilino 等人² 的研究中，針對 12 隻小獵犬在下顎雙側的小白齒以 coil spring 施以連續的力量往近心移動，其中一邊將欲移動的小白齒周圍作 corticotomy，觀察兩邊 1, 2, 4, 8 週顯微鏡底下細胞的變化 (Fig 2.)。在控制組，一週後可在 PDL 觀察到因為 PDL cell 往 periosteum 受到擠壓而產生的 hyaline cell。第四週時，觀察到牙根吸收的現象，此時骨頭尚未吸收。而在第八週時，hyaline cell 已經被組織移除，但是牙根以及骨頭都可以觀察到明顯的吸收情況。

那 corticotomy 的小白齒周圍呢？第一週同樣會觀察到 hyaline cell 的形成，但是在第二週後，hyaline 就已經被移除，同時觀察到骨頭吸收，但是沒有牙根吸收的狀況。第四週及第八週觀察的結果也與第二週相似：只有骨吸收，而沒有牙根吸收。這樣的實驗告訴我們，corticotomy 組沒有觀察到牙根吸收的原因，可能是由於 PDL 較少產生 hyalinization 細胞反應的因素。

3. 為什麼大部分矯正病人不會出現牙根吸收現象？

前面的研究告訴我們，幾乎 93 % 的牙齒會觀察到牙根吸收，但是為什麼臨床上沒有那麼多的矯正病人會出現牙根吸收的情況呢？回到第二題的動物研究中，控制組在第八週的觀察裡，雖然有牙根吸收的情況，但我們可以在牙根的表面上觀察到 cementoblasts，該細胞會分泌形成 new cementum (cellular cementum)，修復吸收的牙根表面。

除了動物實驗外，人也一樣有研究可以證明嗎？Dr. Owman³ 在 1995 的研究中，對 32 位研究對象在將來欲拔除的小白齒施以 50 gm 的力量，施力解除並維持一週後，顯微鏡下可觀察到 28 % 有 repair 的情形，維持八週的組別則可觀察到 75 % 的 undergone repair。



Fig. 1

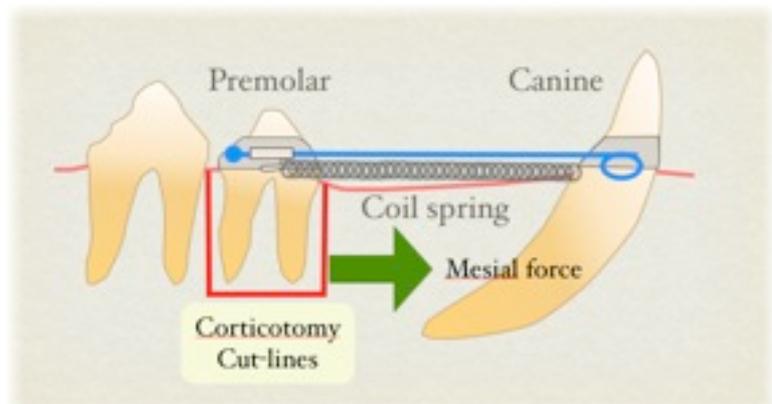


Fig. 2

蘇荃瑋 醫師
貝多芬矯正課程講師



4. 牙根吸收的量以及比例為何？

Dr. Sameshima 等人⁴ 回溯過去 868 位矯正病人，比較他們矯正前後門牙牙根的長度變化，定義 moderate root resorption 為 $\geq 20\%$ 的牙根吸收，比例約為總矯正人數的 3%。

5. 牙根吸收的原因可能是先天遺傳因素造成的嗎？

Dr. Hartsfield 等人⁵ 在 2004 年發表的文章中回顧並整理有關牙根吸收的文獻。結論指出：引起牙根間吸收的各項可能因素中，基因遺傳的因子至少佔了 50%，也就是說，如果接受矯正的病人其父母或親友在接受矯正後有牙根吸收的現象，那該病人將來發生牙根吸收的機率也大為增加。

6. 對牙齒施以較大的力量會產生牙根吸收嗎？

Dr. Owman 等人⁶ 在 1996 年的研究中，將 32 位病人分為兩組，對牙齒依組施以 50 gm 或是 100 gm 的力量，比較牙齒移動的量；然後將各組中的研究對象均分兩小組，分別於四週及七週時將牙齒拔除後，觀察顯微鏡底下的牙根吸收情形。

研究發現：施以 50 gm 或是 100 gm 的力量，對牙齒的移動量沒有統計上的差別；第四週及第七週的牙根吸收情況，也沒有統計上的差異。

如果施力是四倍的時候呢？Dr. Owman⁷ 另外選擇 8 位病人，在左右兩側將來欲拔的小白齒，一邊施力 50 gm，另一邊施力 200 gm，過了七週後比較牙齒移動以及牙根吸收的情形 (Fig. 4.)。研究報告指出：四倍的力量之下，牙根吸收在兩組間，並沒有太大的差別；牙齒移動的量上面，四倍施力下，牙齒移動距離增加了 50%。結論告訴我們：力量的大小，對牙根吸收的情況不會有太大的差異。

7. 哪種施力比較不好 - 連續性或間斷性的力量？

Dr. Maltha 等人⁸ 在 2004 年發表的文章中，依照 Dr. Ilino 的動物實驗方法來檢測連續性力量以及間斷性力量在顯微鏡底下的差異。一樣使用小獵犬在下顎使用 coil spring 近心移動小白齒，連續性施力分別為：10, 25, 50, 100, 200 gm；間斷性施力分為：10 以及 25 gm (每天 16 小時)。研究結果指出：連續性力量會引起比較嚴重的牙根吸收。

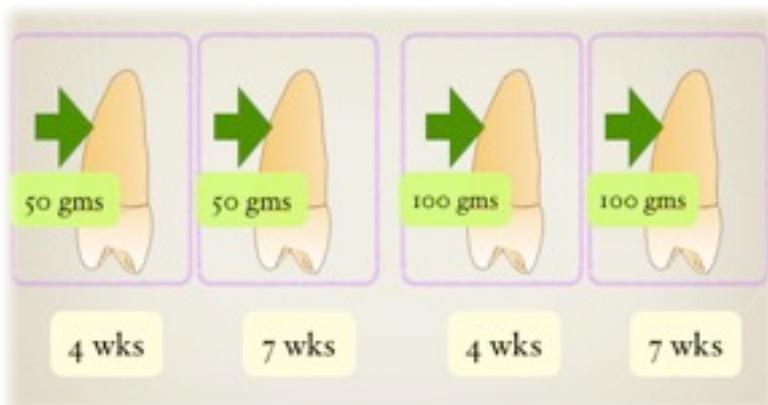


Fig. 3



Fig. 4

為什麼間斷性的施力比較不會引起牙根吸收呢？Dr. Kokich 認為間斷性的力量能讓組織有時間讓 cementoblasts 產生 cellular cementum，保護並修護 acellular cementum 的吸收；因此 Dr. Kokich 建議如果在矯正治療期間發現牙根吸收的現象，應停止矯正治療約六個月，讓組織有時間去修護牙根表面所產生的吸收，之後再重新開始矯正治療。

8. 牙齒移動量的多寡跟牙根吸收有相關嗎？

Dr. Fox 等人^{9,10} 在 2005 年的回顧報告針對牙根吸收的文獻進行分析，最後選出八篇相關的研究整理後，結論指出：牙根吸收與牙根間移動的距離有高度的相關，也就是說，矯正施力後，牙根間移動的距離與矯正前相比如果距離越大，則牙根吸收的情況會越嚴重。另外，矯正治療時間愈長也會導致 external root resorption 機率增加。

9. 矯正結束後，牙根會持續吸收嗎？

Dr. Remington 與 Dr. Kokich 等¹¹ 在 1989 年的研究中，追蹤 100 位矯正期間，出現牙根吸收情況的病人，recall 回來比較矯正結束時以及追蹤 14 年後的根尖 X-ray，牙根長度沒有出現太大的差異，本研究告訴我們：矯正結束，停止對牙齒施力之後，牙根的吸收也會停止。

10. 牙根吸收的病人需要重新矯正治療，要注意什麼？

當牙根吸收的病人出現在我們面前，要求重新矯正或是補綴的治療時，大部份的醫師可能都會建議病患要將牙根吸收的牙齒拔除後再來制定治療計畫；Dr. Kokich 分享了一個 follow 13 年的 case，上顎雙側門牙的牙根吸收約 3/4 以上仍能夠維持而沒有掉落，但是如果 13 年前就拔除換成牙橋或是植體，則後續美觀上一定難以比原本的牙齒來得自然。以上是 Dr. Kokich 針對牙根吸收的部份與我們的分享。

Acknowledgements

感謝黃瓊嬋醫師協助審稿及訂正。

References

1. Owman-Moll P et al. Orthodontic Tooth Movement and Root Resorption with Special Reference to Force Magnitude and Duration. A Clinical and Histological Investigation in Adolescents. Swed Dent J 105:1-45, 1995
2. Iino S et al. Acceleration of Orthodontic Tooth Movement by Alveolar Corticotomy in The Dog. Am J Orthod Dentofacial Orthop 131:448 e1-8, 2007
3. Owman-Moll P et al. Repair of Orthodontically Induced Root Resorption in Adolescents. Angle Orthod 65:403-408, 1995
4. Sameshima GT et al. Characteristics of Patients with Severe Root Resorption. Orthod Craniofac Res 7:108-114, 2004
5. Hartsfield J et al. Genetic Factors in External Apical Root Resorption and Orthodontic Treatment. Crit Rev Oral Biol Med 15:115-122, 2004
6. Owman-Moll P et al. Effects of Doubled Orthodontic Force Magnitude on Tooth Movement and Root Resorptions. An Inter-individual Study in Adolescents. Eur J Orthod 18:141-150, 1996
7. Owman-Moll P et al. The Effects of A Four-fold Increased Orthodontic Force Magnitude on Tooth Movement and Root Resorptions. An Intra-individual Study in Adolescents. Eur J Orthod 18:287-294, 1996
8. Maltha JC et al. Incidence and Severity of Root Resorption in Orthodontically Moved Premolars in Dogs. Orthod Craniofac Res 7:115-151, 2004
9. Fox N et al. Longer Orthodontic Treatment May Result in Greater External Apical Root Resorption. Evid Based Dent 6:1, 2005
10. Segal GR et al. Meta Analysis of the Treatment-related Factors of External Apical Root Resorption. Orthod Craniofac Res 7:71-78, 2004
11. Remington DN et al. Long-term Evaluation of Root Resorption Occurring During Orthodontic Treatment. Am J Orthod Dentofacial Orthop 96:43-46, 1989



張慧男 博士

榮獲美國齒顎矯正學會 109th 年會

高球邀請賽

冠軍

張博士當日於波士頓國際球場擊出385碼，同時榮獲遠距獎

世仰科技

Newton's A

金牛頓藝術科技

同賀



Chris, "just another congratulations on your presentation. It was splendid! I have never seen a more interesting and captivating slide show in my life. It was dynamic, creative and innovative. Thanks again for a great display and also for the advice I gained from it."

Larry

張博士受美國齒顎矯正學會第109屆年會邀請，進行「阻生虎牙治療」之學術演講，以上為美國臨床矯正雜誌主編Dr. Larry White聽後感言。

Interdisciplinary Treatment (Part I)

— Summary of Dr. Kokich's farewell lecture in Taiwan —

在一整天的課程開始前，Dr. Kokich 首先要回答一個問題：

Q：較寬的牙齒可以移到較窄的 alveolar ridge 嗎？會不會造成牙周問題？

Dr. Kokich 指出，牙齒不能移到 bone 內，“socket”才能移到 bone 內。當 socket 的“lamina dura”碰到 cortical bone 時會產生 new bone，因此可以慢慢移到較窄的 alveolar ridge 內而不會造成牙周問題。

舉例說明：

14 歲小朋友左下第二小白齒先天缺牙，左下第二乳白齒 ankylosis。若等到以後再拔除，會導致此區的 alveolar ridge height 與鄰近 alveolar ridge 產生明顯高度落

差，造成牙周問題，因此計畫盡快拔除 ankylosis 的乳牙以後再植牙。小心拔除乳牙後，拔牙區頰側 ridge 有明顯的吸收。若在這種情況下植牙，植體位置將會嚴重偏向舌側，必須先在頰側補骨後才能植到理想位置。

那麼，將第一小白齒向遠心移動到這個缺損區可能嗎？Dr. Kokich 請大家回想 Biology 以及 biological reaction，當 socket 碰到 cortical bone 時，內部 PDL 吸收 bone、外部 periosteum 會 induce bone 增生；所以當第一小白齒慢慢向遠心移動到第二小白齒位置時，原本第一小白齒位置 ridge 寬度幾乎維持不變，非常適合植牙。手術中發現原本缺損部位的 bone 長得很好。這證明“socket”可以移到較窄的 alveolar ridge，缺損區的 bone 也會長得很好，牙齒（socket）移動過的 ridge，寬度幾

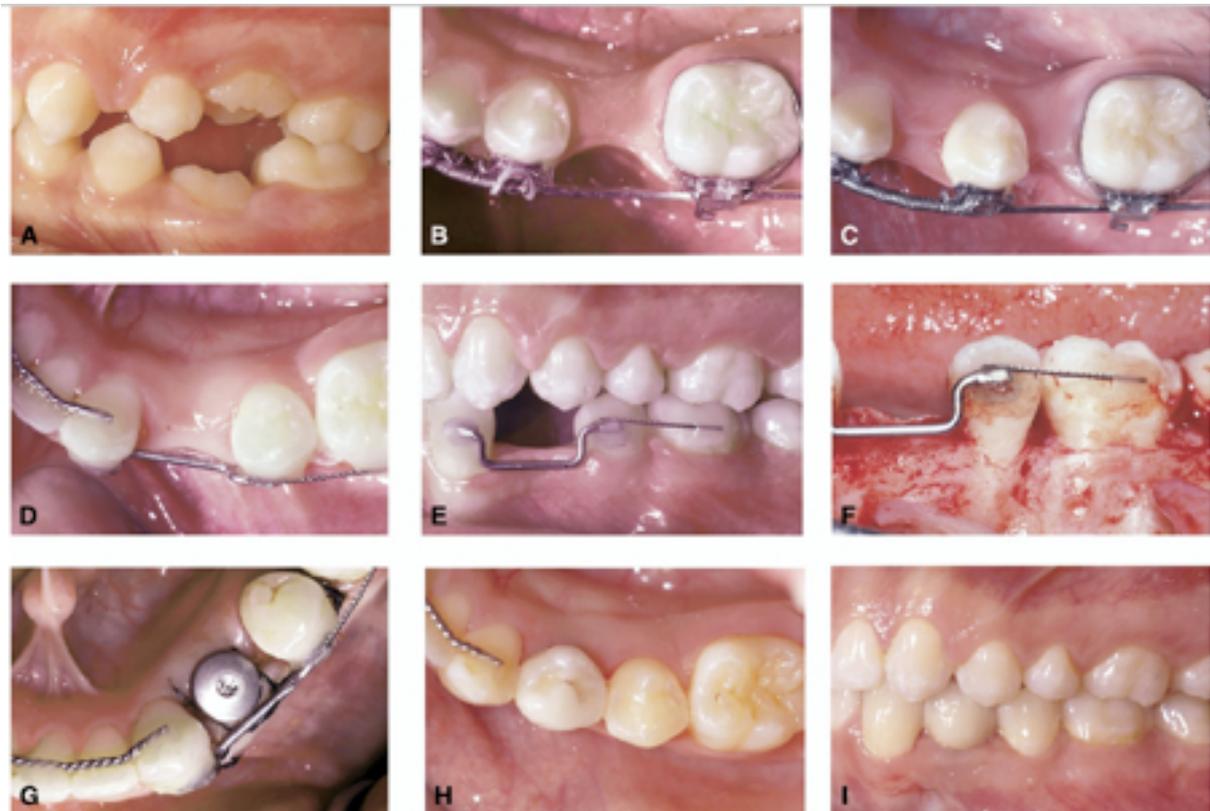


Fig. 1 Case from Dr. Kokich (Interrelationship of Orthodontics with Periodontics and Restorative Dentistry)

黃瓊燁 醫師
成大醫學中心口醫部兼任主治醫師
幸福牙醫診所主治醫師
貝多芬矯正課程講師



蔡鎰隆 醫師
誠品、長春牙醫診所
貝多芬矯正課程講師



乎維持不變，但缺點是這樣做會花很久的時間。因此 Dr. Kokich 建議大家，如果患者本身就合併有很複雜的咬合狀況，本來就預期會做比較久的矯正治療時，才去嘗試這樣子的治療計畫，也就是“Implant site development by lateral tooth movement”；但若患者的口內狀況較單純、預期不需要很長的 treatment time，或是要移過去的 ridge 實在是很窄，Dr. Kokich 建議大家不要嘗試這樣的治療計畫！！

Interdisciplinary treatment

當面對小朋友或是青少年的矯正患者時，因為他們的口內情況通常只有 malocclusion 而沒有牙周、補綴等問題，幾乎都是由矯正醫師自己訂治療計畫、獨自治療完成，矯正醫師容易因此而怠惰，以為自己就可以掌控一切。但在美國，約有 20 ~ 60 % 矯正患者是成人，口內狀況較為複雜、不像青少年那樣單純，可能有牙周病、缺牙、問題牙齒等；需要牙周治療、補綴物、植牙、外科手術的幫助，此時就需要矯正醫師、牙周醫師、補綴醫師、根管醫師與口腔外科醫師等一起討論，一同設定 treatment objective, treatment sequence 與 treatment vision 等，形成一個 teamwork，才是所謂的“Interdisciplinary treatment”。

Multidisciplinary treatment 就等於 Interdisciplinary treatment 嗎？

Dr. Kokich 在此針對 Multidisciplinary 與 Interdisciplinary 下了明確的定義：

Multi-disciplinary = more than one discipline ；

Inter-disciplinary = integration of more than one discipline !!

所謂的 multidisciplinary 是指有超過一個以上的科別來共同治療一個患者，但各科醫師都有他自己的治療計畫與流程，若各科醫師間沒有溝通好，患者可能在不同

科醫師間轉來轉去、治療了很久，最後卻不知該如何完成。

而所謂的 interdisciplinary 是指我們“整合”一個以上的科別，包括矯正、牙周病、補綴、根管與口腔外科等各科醫師，大家一起坐下來討論患者的治療、訂出治療目標、並設立治療流程。

Dr. Kokich 在此舉出了一個 Amelogenesis imperfecta 的患者為例，這個患者必須接受矯正治療，但是他的補綴醫師和矯正醫師並沒有事先做良好的溝通，所以患者每次去補綴醫師那裏做一顆臨時牙套、再回矯正醫師那裏上矯正器，患者來來回回的結果導致治療遲遲不能完成，牙齒的 axis 都不對而且有嚴重牙周炎，這就是因為醫師彼此之間沒有先做溝通，矯正醫師是在排列他的“restorations”，而非“teeth”!! 像這樣的情況下，我們必須先將患者的現有情況還原，評估 bone level、gingival level、root length、root angulation、upper incisor 位置之後，首先由牙周病醫師先清除所有發炎情況，接下來根管醫師評估那些牙齒能治療保留，補綴醫師看那些缺牙區要怎樣補綴復形，所有 provisional crowns 必須依照原本該有的角度位置外形製作，在由矯正醫師依照治療目標移動牙齒。這些都必須是各科醫師大家一起來討論的，”科際整合”是治療成人患者成功的關鍵。以 Dr. Kokich 本身為例，他的 team 由 12 位各科 specialists 及 2 位 GP doctors 共同組成，而要整合這些不同科別醫師，最重要的就是要：Speak their languages, know their needs, educate other specialists! 當單純做兒童或青少年的矯正治療時，矯正醫師可以自己訂定 ideal treatment objectives；但是當治療口內情況複雜的成人患者時，最後訂定治療計畫的應該是補綴科醫師！！接下來，Dr. Kokich 就要以五個分項來介紹如何和各科醫師斡旋，訂定複雜病例的治療計畫：

Interdisciplinary Treatment Planning: Guidelines for Managing Complex Cases

1. Generate “realistic” occlusal objectives
2. Create the vision
3. Establish the sequences of treatment
4. Determine the responsibility got periodontal problems
5. Position teeth to enhance future restorations

1. Generate realistic occlusal objectives

什麼是 proper occlusion 呢？Occlusion 是矯正學之父 Edward H. Angle 所提出的概念，但要如何建立這樣的 proper occlusion 呢？Dr. kokich 要告訴大家，他如何建立 proper occlusion。首先必須要列出患者的 problem lists，設定要達到的 occlusal objectives，再逐一解決列出解決問題的方法以達到 objectives。

Occlusal objectives 可以是 idealistic (理想的) 也可以是 realistic (實際的)，但到底要設定那一種 occlusal objectives，有辦法讓 idealistic 等於 realistic 嗎？即使是口

內狀況相似但年齡迥異的兩位患者，Dr. Kokich 也會因為 dental history 時間長短的不同而改變治療計畫。如果是年輕的患者，當然要做到 idealistic = realistic；但如果不是年輕患者，已經有很久的 dental history，他們需要的是 occlusally realistic 而不是 idealistic，這時 idealistic ≠ realistic。

那我們該如何訂出 realistic occlusal objectives 呢？Dr. kokich 訂出 realistic objectives 的流程 (Fig. 2)，首先是要列出 problem list，根據 problem list 訂出 “Idealistic” objectives，之後再問，自己與患者真的需要這些嗎？達不到這些會如何？評估 occlusal objectives 是否可行的方式，首先要做 wax-up 模型，研究患者過去的 dental history，評估若維持這些情況會不會有問題，以及是否可預期未來會發生什麼問題，最後與患者詳細討論後，訂出 realistic objectives。以下 Dr. Kokich 舉出幾個 case 來說明，這幾個 case 都有類似情形，我們僅則一說明，筆者並在此提出一個自己的 case 以 Dr. Kokich 的診斷方式來做說明。

Dr. Kokich 案例一：

50:2 歲患者，主訴為深咬，上下牙齒咬合時會咬到牙齦。臨床檢查發現患者為 Class II division 2 咬合，左側 CII canine、molar，右側為 CII canine 但 CI molar，因缺失右下第二小白齒、下顎前牙偏向右側 (Fig. 3)。首先列出 Problem list，並訂出 Idealistic objectives：(Fig. 4)

Dr. Kokich 再根據 Idealistic objectives 去訂出治療計畫。他告訴患者，直接將牙齒排列整齊會產生 6 mm 的 overjet，這樣 bite 會有問題，而且犬齒及大白齒皆不在 CI relationship，因此，要解決你的問題總共有三種方法：

1. 進行下顎手術，做 mandible advancement。
2. 拔除上顎兩顆第一小白齒以及下顎左下第二小白齒。
3. 在下顎騰出右下第二小白齒以及左下多騰出一個第一小白齒的空間，矯正結束後再植牙。

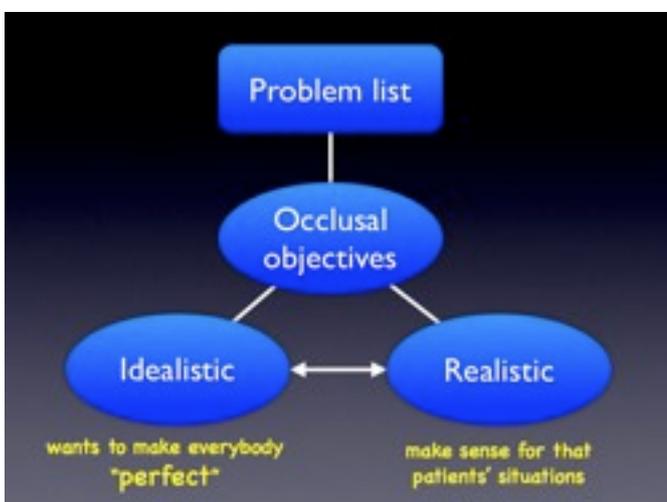


Fig. 2



Fig. 3 50:2 y/o Deep bite case, pre- and post-treatment photographs. (Case from Dr. Kokich, *Interrelationship of Orthodontics with Periodontics and Restorative Dentistry*)

但患者外觀鼻子很挺，不適合上顎拔牙的治療計畫；患者的 chin 也很 prominent，不適合再做手術將下顎前移 6 mm，至於最後一種方法是騰出缺牙空間植牙，但必須先 wax-up 評估可行性。

此時患者問了一個問題：Dr. Kokich, what's a “bite”？這麼多的治療計畫另患者眼花撩亂無從選擇，事實上，患者根本無法了解何謂“Class I occlusion”，而患者本身又是一位律師，因此他告訴 Dr. Kokich，我們的工作其實都一樣，我的客戶和你的患者都是為了我們的“License”而來的，你決定就好、你來告訴我什麼對我最好！！因此患者接受了 wax-up 模型，從 wax-up 模型上可

以看出，這樣的 Realistic objectives 與 idealistic objectives 會有出入，只能達到某些目標：(Fig. 4)

我們要先問自己，患者真正需要的是什麼呢？患者需要 CI canine、molar 嗎？他已經有 37 年 dental history、沒有 TMD、沒有牙周問題、沒有補綴問題、沒有磨耗問題、沒有 clenching、他有任何需要改正 CII canine molar 關係的問題嗎？Dr. kokich 認為沒有、預估以後也不會有問題。這樣的咬合 stability 好不好？通常這類患者 Dr. Kokich 下顎會用 fixed retainer、上顎會用 night guard 來做 retention，不會有問題，而事實上成人患者如果我們將咬

39

Problem list :	Idealistic objectives :	Realistic objectives :
1. Alignment / spacing	1. Level and align arches	1. Level and align arches
2. Midline deviation	2. Correct ML deviation	2. Correct ML deviation
3. Excessive OJ	3. Establish normal OJ	3. Establish normal OJ
4. EXcessive OB	4. Reduce OB	4. Reduce OB
5. Class II molar	5. Create Class I molar	5. Create Class I molar
6. Class II canine	6. Create Class I canine	6. Create Class I canine

Fig. 4 Problem list, idealistic objectives and realistic objectives.



Fig. 5 60:3 y/o case with severe attrition over lower anterior incisors, pre- and post-treatment photographs. (Case from Dr. Kokich, JADA 2008; 139(6): 725-733)

合做大幅度改變反而容易不穩定，因為他已經在這樣的 CII occlusion 維持幾十年都很穩定了。

Dr. Kokich 在說明了幾個 case 之後在此強調，” Don’ t overweight the occlusion ” !! Class II malocclusion 在 13 歲的患者身上可以算是一種 “ disease “，但在五、六十歲的患者身上則不是！！若以 ABO 的 CRE grading 來評分，如果只有 occlusal relationship 這個單項沒有做好，扣分還是有可能低於 26 分！至於和 TMD 的關係，事實上目前也沒有任何證據顯示 Class II malocclusion 跟 TMD 有關，TMD 和靜態咬合（ Static occlusion ）並沒有絕對相關，而是跟 parafunction 有關^{2、3}！！

也許有些人會問，Dr. Kokich，這些都是 CII subdivision 的 case 如果是兩側都是 CII 的 case 會一樣嗎？

Dr. Kokich 案例二 4：

患者 60：3 歲，主訴前牙因磨耗變短，想要讓牙齒看起來長一點。但患者因前牙深咬沒有空間可以做復形，所以 GP 醫師將患者轉診來接受矯正治療，目標是要 open the vertical，將 bite 打開。口內狀況為：下顎兩側第一大白齒缺失、兩側 canine、molar CII (Fig. 5)。我們首先列出患者的 problem lists 及 idealistic objectives：(Fig. 6)

Idealistic objectives 是否真的都可行呢？

Problem list：

1. Alignment / spacing
2. Midline deviation
3. Excessive OJ
4. EXcessive OB
5. Class II molar
6. Class II canine

Idealistic objectives：

1. Level and align arches
2. Correct ML deviation
3. Establish normal OJ
4. Reduce OB
5. Create Class I molar
6. Create Class I canine

Realistic objectives：

1. Level and align arches
2. Correct ML deviation
3. Establish normal OJ
4. Reduce OB
- ~~5. Create Class I molar~~
- ~~6. Create Class I canine~~

Fig. 6 Problem list, idealistic objectives and realistic objectives.

由於患者為 normal facial height，OGS 並不可行，因此我們計畫利用 intrude 上下前牙來達到 level and align arches 的目標；upper midline 與 facial midline 吻合，故 midline deviation 為下顎的問題，因此藉由下顎前牙空間重新分配來 correct midline deviation；establish normal OJ 可以藉由上顎拔牙 或下顎手術前移來得到；reduce OB 可藉由 intrusion 上下顎前牙 intrusion 得到；而 create CI molar 與 canine 需要藉由上下顎拔牙或下顎手術前移來改正。

由此我們根據 idealistic objectives 擬定兩個治療計畫：拔牙或手術治療，但患者不想接受拔牙及手術治療。另一治療計畫為：撐出下顎前牙空間以利植牙並同時關閉前牙間隙，但 G P 醫師要的是上下顎前牙間必須有空間來放置復形物將前牙加長，因此我們先 wax-up 模擬復形後牙齒大小，患者最後選擇此治療計畫。將 Realistic objectives 與 Idealistic objectives 做比較，我們無法達到 create CI molar 與 create CI canine。但患者需要 CI canine molar 嗎？患者已經有47年 dental history、protrusive bruxing habit、沒有 TMD、不需要改正 CII canine molar 關係，因此我們可以預估以後也不會有問題。

Incisors intrusion 有足夠空間後，先以 composite resin 復形，再黏回矯正器做最後調整。至於 incisors 外型與長

度要如何決定？端看 rest position 時，resting lip line 與 incisor 的關係，患者這個年紀約露出 1 mm 的上顎前牙就夠了。完成時一側的 molar 為 Class II，另一側為 end-on Class II。長期追蹤結果如何呢？兩年後仍然蠻穩定的，前牙已換成 porcelain veneer，後牙咬合維持不變。對於青少年、Class II occlusion 合併 protrusive bruxing habit 是個問題，但對於已經使用47年還維持不錯咬合功能的患者，Class II occlusion 不是個問題。

也許有人會問說，Dr. Kokich，你只有幾個 case，你怎麼證明這樣沒關係？Dr. Kokich 同意、他無法證明，但矯正歷史一百年來，還沒有研究能證明 Class I occlusion 比 Class II occlusion 來的好！This is how orthodontists get into trouble !!

有些人可能會說，Dr. Kokick，你只是做 “Compromised” treatment 而已！Dr. Kokich 認為，所謂的 “Compromise” 是指治療完成時並未達到治療目標，但我們治療有達到目標、算是成功的治療。因此，我們矯正醫師要做最重要工作是：訂定 “Realistic” occlusal objectives，並達成這個目標！！



References :

1. Kokich V.G. & Kokich V.O. Interrelationship of Orthodontics with Periodontics and Restorative Dentistry.
2. Ciancaglini R et al, Unilateral temporomandibular disorder and asymmetry of occlusal contacts. J Prosthet Dent 2003;89:180-5.
3. Hirsch C et al, Relationship between overbite/overjet and clicking or crepitus of the Temporomandibular Joint. J Orofac Pain 2005; 19:218-225
4. Kokich V.G. et al, Using orthodontic intrusion of abraded incisors to facilitate restoration: the technique's effects on alveolar bone level and root length. JADA 2008; 139(6) : 725-733

Evidence-Based Damon System

Part I. Extraction vs. Non-extraction and Retention

In August 2008, during my Damon presentation, a member of the audience asked me “is Damon an evidence based system?” My answer to that was I really don’t care the so-called evidence based. If you can show me an orthodontic system that’s easier and provides better treatment than the Damon cases I treated and have just presented, I’ll switch to your system immediately.

Recently I have heard lectures and read articles talking against Damon. For the Damon new users this is kind of confusing. So I would like to clarify some view points about Damon in this series of articles about Evidence Based Damon System.

A. Comments on Justus’s viewpoints about Damon

On December 7th, 2008, Roberto Justus gave a one-day course about root resorption. In his course, he criticized Damon system as followings :

- (1). Dwight Damon has a financial interest in the product (Damon brackets), so his credibility is in jeopardy (Fig. 1). Justus is very proud that he has no financial interest related to any products (Fig. 2). In 2006 Las Vegas annual AAO meeting, on the program¹, presenters who have financial and/or beneficial interest in any product or service related to their presentation are

marked with an asterisk next to their name (Fig. 3). Justus even mentioned those who have a financial interest in any product or service, their credibility is in jeopardy, and credibility is like virginity. Once it’s lost, you cannot get it back. What a serious accusation!

- (2). Wennstrom² showed that when teeth were moved lingually, soft and hard tissue might increase, and that moving teeth buccally might decrease soft and hard tissue which might cause bone dehiscence and gingival recession (Fig. 4, 5). Hence, Justus questioned that Damon treatments will create periodontal problems in non-extraction cases.

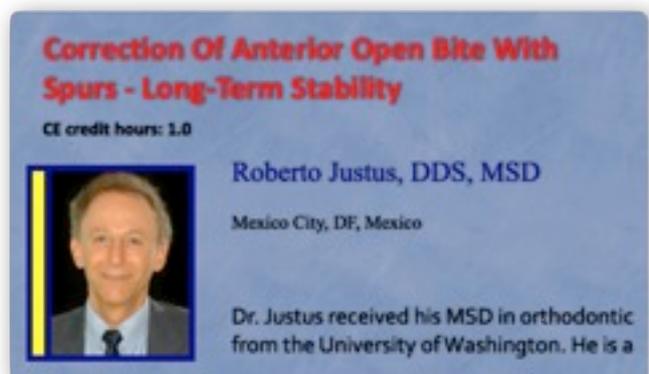


Fig. 2 Roberto Justus was very proud that he has no asterisk by his name, meaning no financial interest related to any products.

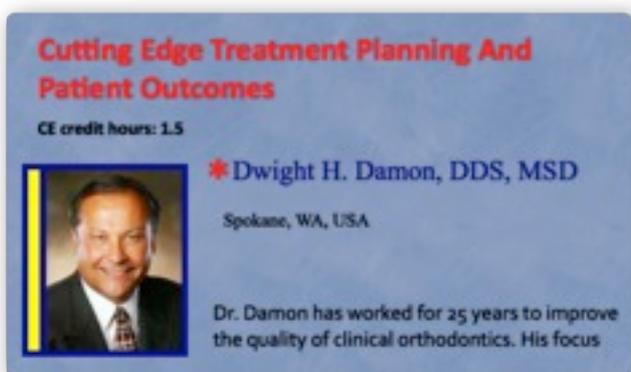


Fig. 1 Dwight Damon has asterisk by his name because he has a financial interest related to Damon brackets. According to Justus’s thinking, Damon’s credibility is in jeopardy.



Fig. 3 In the 2006 Las Vegas AAO program, all the speakers were classified with or without an asterisk.



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

(3). Many studies prove that after long- follow up, the mandibular intercanine width always gets smaller, and mandibular anterior teeth will be crowding again³⁻⁹ (Fig. 6). The Damon system expands the lower anteriors and so relapse will be anticipated in long term follow up.

Lin’s comments on Justus’s view points on Damon system :

(1). Without innovative product development, there will be no good orthodontic system today. It’s not fair to criticize any presenters in AAO who has financial interest in any product. If one accepts Justus’s special thinking, Roth, Damon, Alexander, Clark and Carriere all have lost their credibility. This kind of definition is really shocking. Nowadays, clinical orthodontics is experiencing extraordinary progress, due to continuous product development, such as straight wire appliances, new self-ligating brackets, new functional appliances, etc.

Because of all these great inventors and designers of brackets and system, today we can do orthodontic treatment in a much easier and more efficient way. As we enjoy being an orthodontist nowadays, we owe all these

inventors big credits. How could we say that their credibility is in jeopardy ?

(2). Basically Wennstrom’s concept on tooth movement, can only apply to the traditional edgewise appliances (Fig. 5). It cannot apply to the Damon system’s light and gentle force . In the traditional edgewise, in severe crowding, the

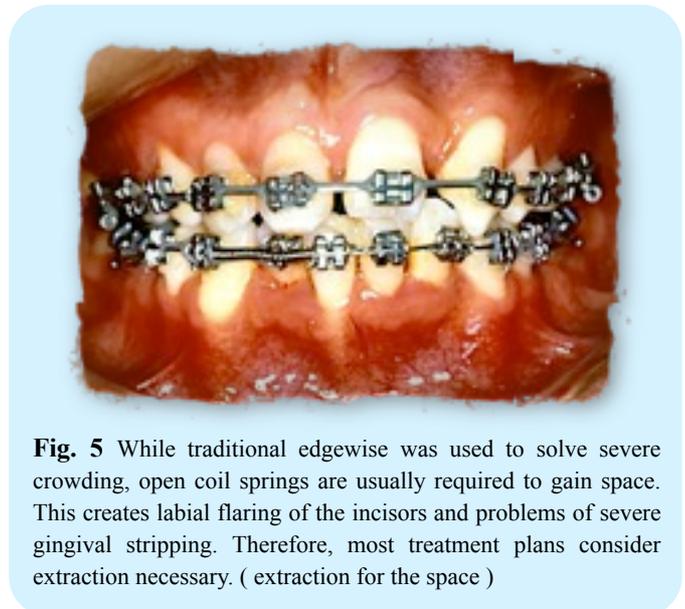


Fig. 5 While traditional edgewise was used to solve severe crowding, open coil springs are usually required to gain space. This creates labial flaring of the incisors and problems of severe gingival stripping. Therefore, most treatment plans consider extraction necessary. (extraction for the space)

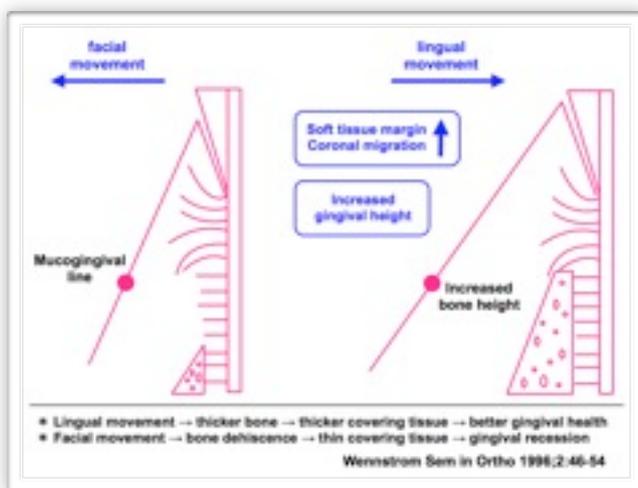


Fig. 4 Wennstrom suggested that when teeth moved facially the soft tissue and hard tissue became thinner which might lead to bone dehiscence and gingival recession problems.



Fig. 6 Most long term studies prove that the mandibular intercanine width always get smaller with aging, and mandibular anterior teeth will be crowded again without retention.

only way to solve space deficiency is extraction treatment to prevent expansion. This can and has caused bone dehiscence and gingival recession (extraction for the space). For relieving severe crowding, Damon system can move teeth with bone, so it's really different from Wennstrom's concept. After relieving severe crowding, the dentition still has healthy periodontium (Fig. 7 A, B, C). This is why in the Damon system, we no longer extract for

space deficiency. We extract just for the better profile. (Extraction for the face)

- (3). Little et al showed that regardless of extraction or non-extraction treatment, long term stability is difficult to get on most of the cases (Fig. 8). So in this article, they highly recommend life time retention¹⁰. Justus uses removable retainer while Damon¹¹ uses both fixed and removable one. They both follow Little's guideline for lifetime retention. So why is the concern that expansion will cause future relapse ? Caucasians generally have straight profiles. In the old days, the traditional edgewise appliance could not solve severely crowded cases using non extraction treatment, without creating periodontal problems. Clinicians could only count on extraction treatment, which would often create concave dish-in profiles. Now Damon can relieve severe crowding and maintain the patient's good profile with non-extraction. So why not follow Damon's expansion and non-extraction treatment ? (Fig. 7 A, B, C).

B. Comments on Tweed's philosophy of extraction treatment (Extraction for the Ceph)



Fig. 7A,B A severe CII D2 patient with severe anterior crowding was treated with the Damon system beautifully, without creating any periodontal problem. If using the traditional edgewise, extraction treatment is the only option to prevent periodontal problems, at the expense of creating a dish-in profile. Luckily nowadays, we have a good light force Damon system to treat this kind of severe crowding cases, without extraction of premolars. As a result we are able to make her profile a little bit fuller and younger.

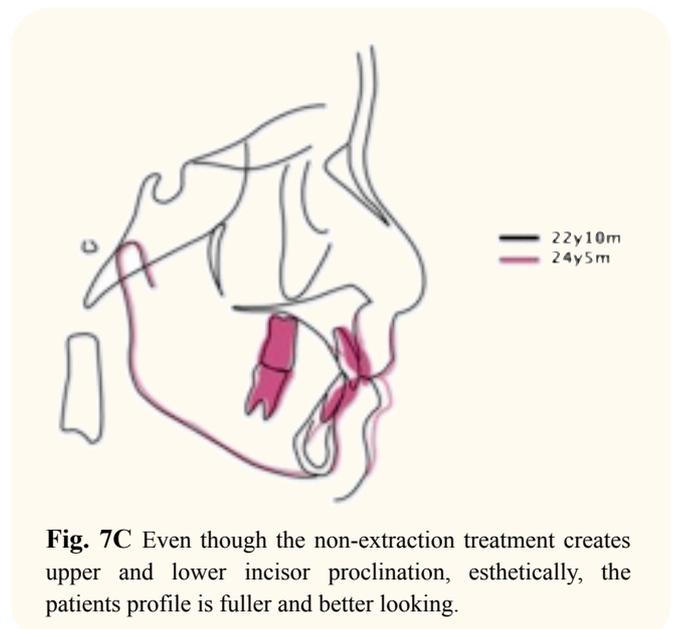


Fig. 7C Even though the non-extraction treatment creates upper and lower incisor proclination, esthetically, the patients profile is fuller and better looking.

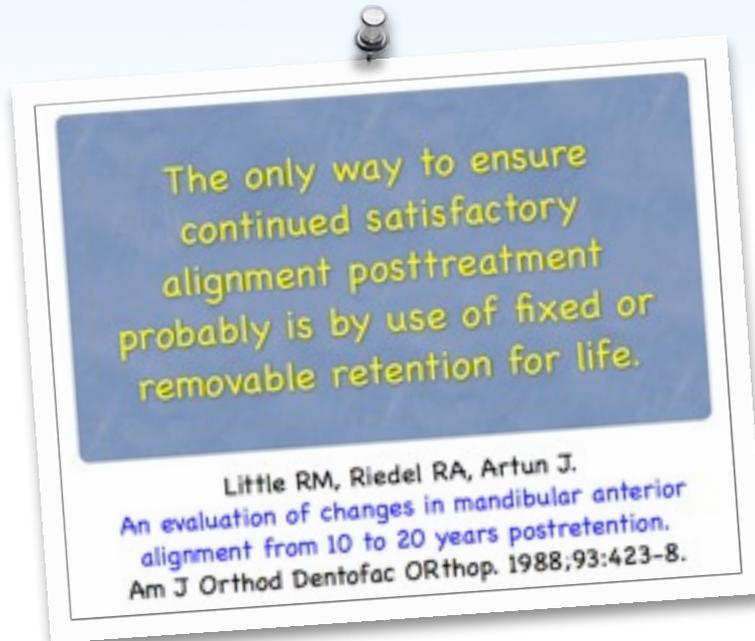


Fig. 8 Little et al recommend lifetime retention.

Tweed¹² in his two volumes textbook, wrote- “The average non-orthodontic normals are selected from the group who presents facial balance and harmony. The inclinations of mandibular incisors are 90° when related to mandibular borders...”. My conclusions, as a result of these studies, were and are that the orthodontist must, if he is to attain facial

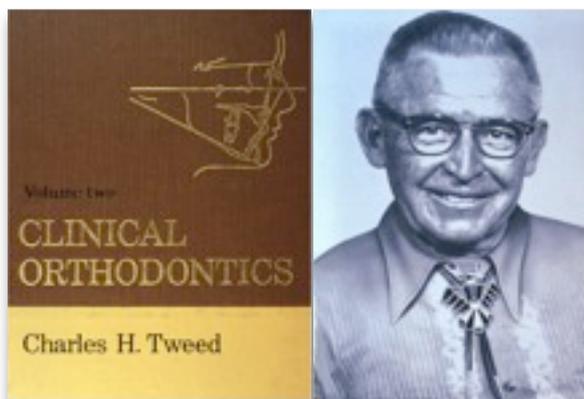


Fig. 9 Tweed’s 2 volumes textbook emphasized treatment goal should have the lower incisors about 90° to the mandibular border. (extraction for the Ceph)

esthetics and dentures similar to those found in non-orthodontic normals, position the mandibular incisors within the normal range of -5° to +5°.” (Fig. 9).

In Tweed’s textbook¹² volume 2, there is a case where the goal was to achieve the FMIA of 65°. Four premolars were removed, even though the patient has no obvious crowding and a very good profile at the beginning. The end result is a very concave senile profile at the age of 13 years and 7 months (Fig. 10). In the author’s case (Fig. 7), because of relief of crowding and correction of Class II, the lower incisors were proclined. The end result profile is very good. If the patient keeps wearing the retainer, the lower dentition will remain well aligned. This is a typical example of extraction for the face, rather than the space.

Tweed’s philosophy of extraction for the cephalometric data is quite risky (extraction for the Ceph). In USA, the author has seen so many patients just having four premolars removed because their orthodontists tried to produce a better Tweed triangle data.

The author feels that Damon’s light force system reduces the extraction rate significantly in Caucasian patients. In Asian patients, even though we have much fewer non-extraction

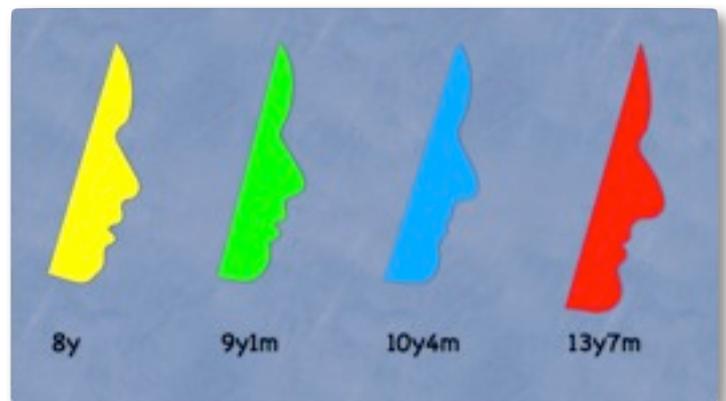


Fig. 10 In Tweed’s textbook page 657-667, the case was treated with four premolar extractions, driven by the ideal of achieving IMPA 65°. Eventually the case started from a straight profile and was turned into a very concave profile at the age of 13 years and 7 months. Try to imagine this patient at 50. What a terrible example of extraction for the ceph.

cases, the extraction rate is also cut down relatively significantly also, due to using Damon system.

Nowadays, the Tweed International Foundation For Orthodontic Research in Tucson, Arizona, offers very good wire bending typodont courses. It's an excellent institute for training basic wire bending. But we still have to remember important diagnostic knowledge, because extraction treatment planning should not depend on Tweed triangle data only.

C. Comments on Zachrisson’s viewpoints about self-ligating brackets (SLB)

Zachrisson¹³ emphasizes that orthodontic treatment should not increase the mandibular intercanine width²⁻⁹, should not procline lower incisors¹⁴, and should not have long-term post treatment retention (Fig. 11, Table 1).

Zachrisson quoted Bishara’s study¹⁵, which emphasized that, through growth and aging, the mandibular intercanine width is only getting smaller (Fig. 12). So expansion treatment of mandibular anterior teeth is not good.

He demonstrates that he follows the above principle to treat a severe bimaxillary crowding. The author does not see the severe crowding at all. This is a CII D1 9 years 10 months

boy, with 9 mm overjet, deep overbite, with gingival impingement. For preventing increasing proclination of lower incisors, Zachrisson used complicated VTO (Visual Treatment Objective) and developed a treatment plan not using bite-jumping appliances. Instead, two upper first premolars were removed. Right after 5 years orthodontic treatment, the profile is kind of straight, but after 16 years’ follow up, the patient still has a dished-in profile (Fig. 13). Zachrisson claimed that is due to unexpected nose growth (The author prefers to call it VTO failure) and the patient, after 16 years post debonding, still wears a mandibular canine-to-canine fixed retainer.



Fig. 11 Zachrisson comments on self-ligating brackets.

	SLB	Zachrisson
Diagnosis, Tx plan, Tx objectives	Disregard	Regard
Md. inter-canine width	Can be increased	Cannot be increased
Md. incisor position	Can be increased	Cannot be increased
Permanent retention	Yes	Not good

Table 1. Zachrisson’s comments on SLB

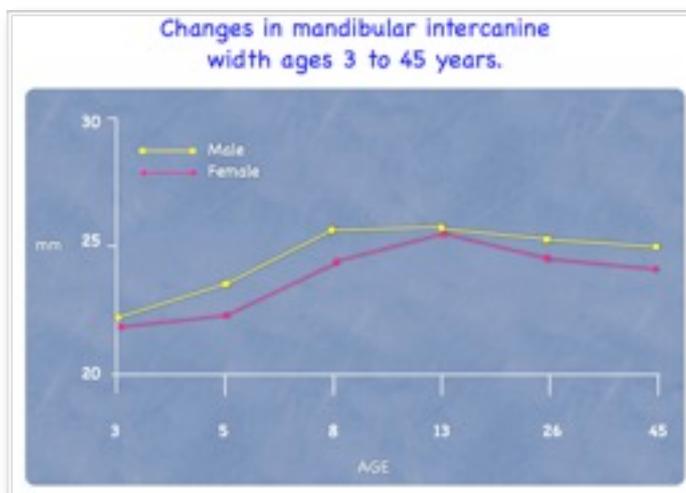


Fig. 12 Bishara found that clinician should expect either no changes or a slight decrease in arch width in permanent dentition.



(Why does Zachrisson repeatedly assert permanent retention represents practical and ethical hazards when this patient, 16 years after treatment, still wears a fixed mandibular canine-to-canine retainer?)

Lin's Comments :

- (1) This is not a good case to perform two upper premolar extractions; it should be a non-extraction case.
- (2) For preventing mandibular lateral expansion and proclination of lower incisors, extraction of two upper premolars in fact created a dished-in face 16 years later. It's a failed treatment plan. I believe Zachrisson's treatment plan neglected some of the ideal treatment objectives.
- (3) 16 years after the treatment, the patient still wears a fixed retainer. So what is wrong with permanent retention ?

Dr. Lin's Conclusion :

Orthodontists should not be restricted to maintaining mandibular intercanine width and avoiding proclination of mandibular incisors. This leaves them no choice but to undertake extraction treatment and ultimately produce dished-in profiles and ruin the patient's outlook. We should do

extraction for the face, instead of for the space and for the ceph.

There is nothing wrong with permanent retention, as long as the patient has been given informed consent for long-term stability, with a view to preserving the finished result. We should educate the patient that, in their life, there is only one thing which is not changing and that is every thing changes. If patients want to keep post treatment dentition straight, only lifetime retention can prevent relapse.

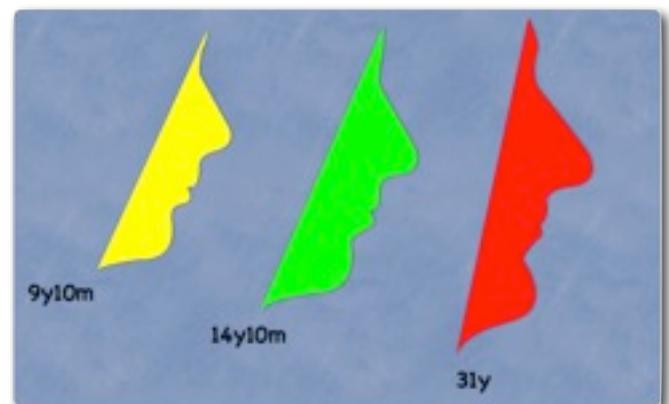


Fig. 13 Zachrisson removed two upper first premolars, and in the end the patient has a dished-in profile.

References :

1. American Association of Orthodontists, 106th Annual Session, May 7-8, 2006, Las Vegas, Nevada, USA
2. Wennstrom JL. Mucogingival considerations in orthodontic treatment. *Semin Orthod* 1996;2:46-54.
3. Riedel RA. Post-pubertal occlusal changes. In McNamara JA (ed). *The biology of Occlusal Development*, Monograph 7, Craniofacial Growth Series, Center for Human Growth and Development. Ann Arbor: University of Michigan, 1977:113-40.
4. Riedel RA. A post-retention assessment of relapse, recidivism, adjustment, change, and stability. In city of Nymegen, 1988:281-306.
5. Gorman JC. The effects of premolar extractions on the long-term stability of the mandibular incisors. In Burstone CJ, Nanda R (eds). *Retention and Stability in Orthodontics*. Philadelphia: WE Saunders, 1993:81-95.
6. Sadowsky C, Schneider BJ, BeGole EA, Tahir E. Long-term stability after orthodontic treatment: Nonextraction wit prolonged retention. *Am J Orthod* 1994;106:243-9.
7. Paquette DE, Beattie JR, Johnston LE. A long-term comparison of nonextraction and premolar extraction edgewise therapy in "borderline" Class II patients. *Am J Orthod* 1992;102:1-14.
8. Franklin GS. A longitudinal study of dental and skeletal parameters associated with stability of orthodontic treatment [thesis]. University of Toronto, 1995.
9. Franklin GS, Rossouw PE, Woodside DG. A longitudinal study of dental and skeletal parameters associated with stability of orthodontic treatment [abstract]. *Am J Orthod* 1996;109:109.
10. Little RM, Richard AR, John Artun. An evaluation of changes in mandibular anterior alignment from 10 to 20 yesaras postretention. *Am J Orthod* 1988;93:423-8.
11. Damon D. *Damon system, The Workbook*, 2004 Ormco Corporation.
12. Tweed CH. *Clinical Orthodontics*. Vol. I, II. St Louis, C.V. Mosby Co; 1966. P. 657-70.
13. Zachrisson B. Use of self-ligating brackets, superlastic wires, expansion / proclination, and permanent retention – A word of caution. *World J Orthod* 2006;7(2):198-208.
14. Mills JRE. The stability of the lower labial segment. *Dent Practit* 1968;18:293-306.
15. Bishara SE, Jakobsen JR, Treder J, Nowak A. Arch width changes from 6 weeks to 45 years of age. *Am J Orthod Dentofac Orthop* 1997;111:401-9.

Summary of Comments on Damon System

A. Justus vs. Lin

Justus	Lin
Financial interest related products make Damon's credibility in jeopardy.	We should appreciate Damon design such a great system.
<ul style="list-style-type: none"> • Extraction for the space on severe crowding, based on Wenstrom's concept to get better periodontal change. 	<ul style="list-style-type: none"> • Extraction for the face, light force won't create perio problem. • Can do nonextraction treatment easily and maintain patient's good profile.
<ul style="list-style-type: none"> • Avoid increase intercanine width • Long term retention. 	<ul style="list-style-type: none"> • Expansion is possible • Long-term retention.

B. Tweed vs. Lin

Tweed	Lin
<ul style="list-style-type: none"> • Lower incisors should be upright on basal bone. Extraction for the ceph. • Creates too many extraction cases and dished-in profile. 	<ul style="list-style-type: none"> • Allowed proclination of incisors, Extraction for the face. • permanent retention to achieve better long term profile.

C. Zachrisson vs. Lin

Zachrisson	Lin
<ul style="list-style-type: none"> • Avoid increase inter-canine width. • Avoid procline incisors. • Avoid bite-jumping tx. • Extraction tx. creates dished-in profile. 	<ul style="list-style-type: none"> • Extraction for the face. • Using functional appliance and non extraction tx on CLII cases . • Accept some level of proclination of incisors.
Use long-term retention but question lifetime retention.	Lifetime retention.

貝多芬

見習

2009 獎學金

年名單出爐囉！



張倩瑜 (北醫)

古佳怡 (北醫)

蔡欣侑 (Penn State U)

蕭維廷 (台大)

曾千芸 (高醫)

洪煒智 (國防)

許淨瑜 (高醫)

蔡志雄 (國防)

許昭舜 (陽明)

吳尚恆 (高醫)

陳光榮 (北醫)

羅士傑 (北醫)

陳瑞逸 (北醫)

涂世杰 (北醫)

辜昱凱 (高醫)

蘇敏睿 (北醫)

杜勝崴 (國防)

Esthetic Considerations in Orthodontic Treatment

Case Report : Bimaxillary Protrusion with Severe Gummy Smile

Introduction

Gummy smile is difficult to correct by orthodontic treatment, especially for adult patients. In conventional orthodontic treatment, orthognathic surgery (LeFort I impaction) is usually advised in the treatment plan for such cases. However, some protrusion cases with gummy smile can also achieve satisfactory results without surgery. Besides the excessive height of the maxilla, maxillary protrusion also contributes to the existence of gummy smile. Therefore, for a protrusion case with gummy smile, the treatment modality should be aimed on maximal retraction and intrusion of upper anteriors. With the help of miniscrew anchorage, we can achieve a great profile and esthetic improvements in protrusion cases with gummy smile by non-surgical means. Here the author will present a case to demonstrate the treatment philosophy with focus on esthetic considerations.

Case report

Clinical examination

This 32-year-old female patient complained of protrusion and gummy smile (Fig. 1). After clinical examination the extraoral frontal view showed severe protrusion and obvious mentalis strain. The lateral view showed convex profile. Besides the maxillary protrusion, the mandibular retrognathism was evident and the chin was quite retrusive. The smile view revealed severe gummy smile which was one of her chief complaints. The intraoral examination showed deep overbite and excessively upright upper incisors (Fig. 2). The upper six anteriors are all full ceramic crowns. These crowns are individually well fabricated. There is no space deficiency for both arches and both of them are in good alignment. The arch form of the two are symmetrically ovoid shape. The molar and canine relationship on both sides are Class II.



Fig. 1 Pre-treatment extraoral photographs of the patient showed severe protrusion and gummy smile.



Fig. 2 Pre-treatment intraoral photographs showed Class II dental relationship with no crowding at all. Upper six anterior full ceramic crowns were noted .



Fig. 3 Pre-treatment cephalogram revealed skeletal Class II, high angle and bimaxillary protrusion.

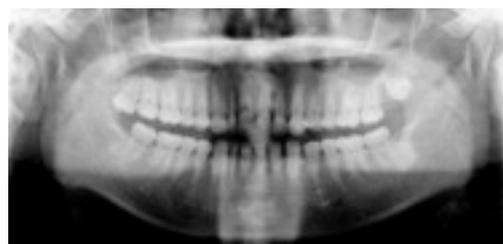


Fig. 4 Pre-treatment panoramic X-ray showed nothing particular except the existence of two upper wisdom teeth. (Artifact on right anterior region was noted.)

Dr. Irene Yi-Hung Shih
Beauty Forever Orthodontic Clinic



Dr. Johnny Joung-Lin Liao
Beauty Forever Orthodontic Clinic



Radiographic examination

Cephalometric readings showed Class II skeletal relationship (ANB : 7.9 degree) and high mandibular plane angle (SN-MP : 37.5 degree) (Fig. 3). Maxillary protrusion was evident.(A-Nv : 4.1 mm) Mandibular retrognathism is quite severe. (Pog-Nv : -9.1 mm) Upper incisors were retroclined, (U1- SN : 90.8 degree) and lower incisors were proclined, (L1-MP : 100 degree) which were typical dental compensations for skeletal Class II relationship.

There are no particular findings on the panoramic X-ray except two upper wisdom teeth were noted (Fig. 4).

Diagnosis and treatment plan

The diagnosis for this lady was skeletal Class II, high mandibular plane angle with bimaxillary protrusion. Two treatment options were proposed to her.

Option 1 : Two-piece LeFort I osteotomy on maxilla to solve the gummy smile and protrusion problem. Anterior subapical osteotomy and sagittal splitting on the mandible to advance the mandible were suggested to achieve the best profile change. Four first bicuspid extraction were also advised along with orthognathic surgery.

Option 2 : Four first bicuspid extraction and maximal retraction with mini-implant anchorage were planned to reduce protrusion as much as possible. Gummy smile may be improved to some extent using mini-implant anchorage to intrude the upper anteriors. However, this may lead to the overgrowth of soft tissue and excessive alveolar contour.



Fig. 5 The progressive records during space closure demonstrate the use of upper and lower anterior orthobonescrews for intrusion.

Hence, crown lengthening procedure was recommended to reestablish proper crown height of upper anterior teeth.

After thorough discussion with the patient, she decided to choose option 2. The patient was also informed of the possibility of alveoloplasty indicated after a large amount of anterior retraction.

As for the two upper wisdom teeth, extraction was suggested whenever they erupted to adequate access.

Treatment procedure (Fig. 5,6,7)

2005/08/23 Full fixed appliance was set up in the upper arch. 0.016" NiTi archwire was inserted.

2005/09/06 Upper archwire was transitioned into 17x25 NiTi. An upper anterior subapical miniscrew was inserted under ANS (anterior nasal spine). A 0.014" inch ligature wire was extended from the neck beneath the platform of the screw and a hook was formed at the end of the ligature wire. Thus, the intrusive force to upper incisors can be applied by connecting the hook and the main archwire with elastic chains.

2005/10/11 16x22 NiTi archwire was inserted in the lower arch after initial bonding of lower arch.

2005/11/29 Lower archwire was shifted into 16x22 SS archwire.



Fig. 6 Upper and lower elastic chains were used to close the space. The upper dentition was reinforced with orthobonescrew anchorage.

- 2006/01/24** Upper archwire was also proceeded into 16x22 SS archwire.
- 2006/02/14** Lower anterior subapical miniscrew was inserted below the lower central incisors to apply the intrusive force.
- 2006/03/14** Upper and lower elastic chains were used to consolidate the arches with sliding mechanics.
- 2006/11/08** 17x25 SS archwires for upper and lower arches were applied to get more appropriate torque control. Two .014 inch SS torquing springs were also used on two upper central incisors.
- 2008/08/06** All fixed appliances were removed.
- 2008/08/21** Alveoplasty and crown lengthening were performed in the upper arch (Fig. 8,9).

The total treatment duration for this patient was nearly three years. The profile was improved dramatically and the gummy smile was totally disappeared (Fig. 10). The ideal molar Class I occlusion was achieved (Fig. 11). Post-treatment cephalogram revealed good vertical control and obvious reduction of lip protrusion (Fig. 12). Post-treatment panoramic X-ray showed ideal root parallelism after space closure (Fig. 13).

Discussion

The primary concern for this patient is to reduce protrusion, so maximal anchorage by miniscrews is the key to

treatment success. According to the superimpositions of pre- and post-treatment cephalograms (Fig. 14), we can see the maximal anterior retraction without any anchorage loss on the upper arch. Furthermore, the whole consolidated upper arch was distalized to get a molar Class I relationship and achieve more profile improvement. There is no anchorage reinforcement in the lower dentition so the space closure in the lower arch was reciprocal with moderate anchorage loss which was helpful for the Class II correction. In such a high angle case correcting the Class II relationship without interarch elastics favors vertical control which avoids the lower molar



Fig. 7 The space closure was completed with sliding mechanics.



Fig. 8 Alveoplasty was performed during crown lengthening procedure.



Fig. 9 The photographs demonstrate the difference between pre- and post-surgical conditions of incisor crown height and alveolar contour. The lower exostosis was left untreated.

extrusion. Maximal retraction and vertical control are the keys for successful profile improvement of high angle protrusion cases.

However, the excessive gingival display of an open smile might be an obstacle to achieve ideal esthetic results. With the help of anterior subapical miniscrew, we can intrude the upper anteriors to such an extent the major part of gummy smile was reduced and the residual gummy smile can be corrected by the crown lengthening procedure to reestablish the proper crown height after anterior teeth intrusion (Fig. 15). After a massive amount of retraction, using mini-implant anchorage, the exostosis became quite prominent. This can be solved by alveoplasty during the crown lengthening procedure. This patient only received the periodontal surgery on the upper arch so we can see the clear contrast between the operated and unoperated area in the upper and lower arches (Fig. 9). The primary concern of this surgery is of course the esthetics.



Fig. 10 Post-treatment extraoral photographs showed much more relaxed and balanced lips without muscle strain and great improvement in lateral profile. The excessive gingival display was totally gone even in a big smile.



Fig. 11 Post-treatment intraoral photographs showed molar Class I relationship and good interdigitation.

Another factor for the esthetic considerations is the torque control of upper incisors. The upper incisors of this patient were retroclined before treatment. The necessity for a large amount of incisor retraction made the torque control even more difficult. Conventional torque control with the third order bend on the archwire and/or pretorqued bracket slot might not be enough for this difficult situation. It is because the moment arm is too small in the archwire diameter and the size of slot. The .014" Elgiloy Warren's torquing spring which provided the largest possible moment arms on the upper incisors were used in this case to get the best torque control (Fig. 16). Although the incisor torque after treatment is still too upright, it is still better than the original incisor torque. That means we can observe bodily movement of upper incisors on the cephalometric superimpositions and modest root movement was achieved. If it were not this case, the retroclination of upper incisors would

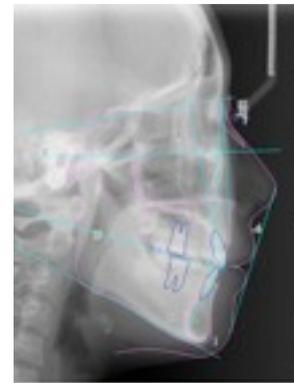


Fig. 12 Post-treatment cephalogram revealed a good vertical control and an obvious reduction of lip protrusion.



Fig. 13 Post-treatment panoramic X-ray showed ideal root parallelism after space closure.

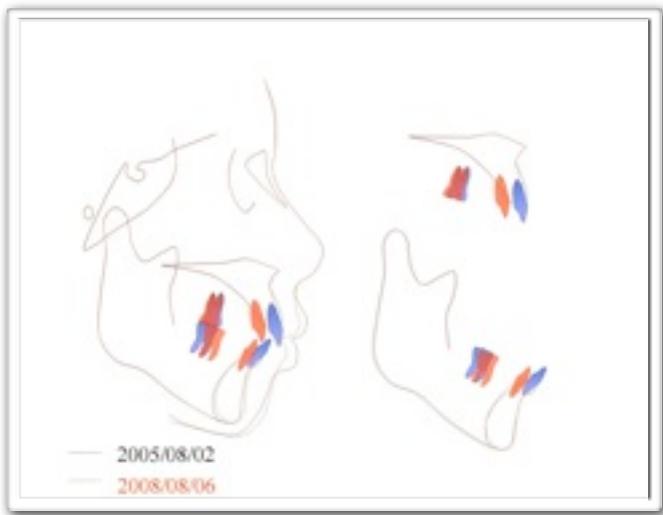


Fig. 14 Cephalometric superimpositions showed maximal anchorage control over upper arch and genuine intrusion of both upper and lower anterior teeth.

have been disastrous for this patient with such a large amount of incisor retraction.

The overbite control before space closure was also very

important for this kind of deepbite patients. With the upper and lower anterior miniscrews, the bite was opened smoothly without too much difficulty. It made the space closure proceed much easier without overbite impedance. Then the intrusive forces in the front teeth were discontinued and considerable attention was given during space closure to monitor the proper overbite. After all spaces were consolidated and the buccal interdigitation was all on solid Class I, the incisal contacts were lack in the anterior segments. Since there were all full ceramic crowns in the upper anteriors, canine to canine, there were two options to establish the proper occlusal contacts in the anterior segments, renewal of the prosthesis or settling with the original prosthesis. Considering the fitness and esthetics of these full ceramic crowns were both acceptable, we decided to cut the upper archwire distal to laterals and remove the posterior segments to have the teeth settled with occlusal forces. However, the lingual contour of these corwns were not so well to fit the corrected occlusion, the overbite was a little bit deep after proper incisal contact achieved.

Skeletal Horizontal			Dental		
SNA	85.1° → 85.2°	(81.5°±3.5)	U1-SN	90.8° → 93.5°	(108.2°±5.4)
SNB	77.2° → 78.1°	(77.7°±3.2)	U1-L1	131.7° → 140.9°	(119.9°±8.5)
ANB	7.9° → 7.2°	(4.0°±1.8)	L1-OP	64.5° → 79.5°	(61.8°±5.4)
A-Nv	4.1 → 3.1 mm	(0±2mm)	L1-MP	100° → 88.4°	(93.7°±6.3)
Pg-Nv	-9.1 → -9.4 mm	(-5±8mm)	U1-NP	14.3 → 5.3 mm	(6.4±2.7 mm)
NAP	16.1° → 14.6°	(5.1°±3.8)	U1 to PP	36.1 → 35.7 mm	(27.9±1.7 mm)
Skeletal Vertical			L1 to MP	44.9 → 42.2 mm	(38.1±1.9 mm)
SN-FH	8.5° → 7.4°	(5.7°±3.0)	Liner		
SN-OP	22° → 25.1°	(16°±2)	Me to PP	55.1 → 60.2 mm	(57.0±6.0 mm)
SN-MP	37.5° → 37.2°	(33.0°±1.8)	Upper lip length	8.7 → 3.4 mm	(2.8±2.0 mm)
UJFH	55.3 → 56.5%	45%	Lower lip	10.7 → 2.4 mm	(2.3±2.0 mm)
LFH	76.2 → 79.4%	55%			

Table 1

Conclusion

There are many factors contributing to the success for a difficult high angle protrusion case with sever gummy smile, including maximal anchorage control, proper vertical control, adequate upper anterior intrusion, torque control during retraction, and periodontal surgery after debonding to reestablish proper crown heights and alveolar contour. Every decision can affect this patient's treatment results. As orthodontists we should not only make the beautiful alignment of beautiful teeth well established, but also make our patients as beautiful as possible.

References

1. Bae SM, Kyung HM et al. Mandibular molar intrusion with miniscrew anchorage. *J Clin Orthod* 2006; 40 (2):107-108.
2. Carrillo R, Carillo RJ, Rossouw PE, Buschang PH et al. Closed-coil springs for intrusion mechanics with miniscrew anchorage. *J Clin Orthod* 2008; 42 (1):17-18.
3. Chang YJ, Lee HS, Chun YS et al. 2004. Microscrew anchorage for molar intrusion. *J Clin Orthod* 38 (6):325-330; quiz 333.
4. Choi KJ, Choi JH, Lee SY, Ferguson DJ, Kyung SH et al. Facial improvements after molar intrusion with miniscrew anchorage. *J Clin Orthod* 2007; 41 (5):273-280.
5. Cozza P, Marino A, Franchi L et al. A nonsurgical approach to treatment of high-angle Class II malocclusion. *Angle Orthod* 2008; 78 (3):553-560.
6. Cuebas JO et al. Nonsurgical treatment of a skeletal vertical discrepancy with a significant open bite. *Am J Orthod Dentofacial Orthop* 1997; 112 (2):124-131.
7. Figueiredo MA, Siqueira DF, Bommarito S, Sannomiya EK, White LW et al. Early tooth extraction in the treatment of anterior open bite in hyperdivergent patients. *World J Orthod* 2007; 8 (3):249-260.
8. Deguchi T, Murakami T, Kuroda S, Yabuuchi T, Kamioka H, Takano-Yamamoto T et al. Comparison of the intrusion effects on the maxillary incisors between implant anchorage and J-hook headgear. *Am J Orthod Dentofacial Orthop* 2008; 133 (5): 654-660.
9. Erverdi N, Keles A, Nanda R et al. The use of skeletal anchorage in open bite treatment: a cephalometric evaluation. *Angle Orthod* 2004; 74 (3):381-390.
10. Hering K, Ruf S, Panchez H et al. Orthodontic treatment of openbite and deepbite high-angle malocclusions. *Angle Orthod* 1999; 69 (5):470-477.
11. Kuroda S, Katayama A, Takano-Yamamoto T et al. Severe anterior open-bite case treated using titanium screw anchorage. *Angle Orthod* 2004; 74 (4):558-567.
12. Kuroda S, Sakai Y, Tamamura N, Deguchi T, Takano-Yamamoto T et al. Treatment of severe anterior open bite with skeletal anchorage in adults: comparison with orthognathic surgery outcomes. *Am J Orthod Dentofacial Orthop* 2007; 132 (5): 599-605.
13. Ma J, Wang L, Zhang W, Chen W, Zhao C, Smales RJ et al. Comparative evaluation of micro-implant and headgear anchorage used with a pre-adjusted appliance system. *Eur J Orthod* 2008; 30 (3):283-287.
14. Park HS, Yoon DY, Park CS, Jeoung SH et al. Treatment effects and anchorage potential of sliding mechanics with titanium screws compared with the Tweed-Merrifield technique. *Am J Orthod Dentofacial Orthop* 2008; 133 (4):593-600.
15. Xun C, Zeng X, Wang X et al. Microscrew anchorage in skeletal anterior open-bite treatment. *Angle Orthod* 2007; 77 (1):47-56.



Fig. 15 Progressive records of the torque control of upper incisors with the Warren's torquing springs during space closure were evaluated.



Fig. 16 Progressive records of overbite control using anterior subapical orthobonescrews showed overcorrection might happen and careful monitoring is needed.

ABO Case Report

Impinging Overbite and Large Overjet

HISTORY AND ETIOLOGY

A 9-year-old boy was brought to our clinic with the chief concern of lip incompetence and the lower lip trap. The patient's medical and dental histories were non-contributory. However, a long-term "lip-trap" habit (lower lip habitually positioned between the maxillary and mandibular incisors) contributed to the excessive overjet and intermaxillary skeletal discrepancy. A small chip on the upper left central incisor due to a bicycle accident had been restored with composite resin in 2005. The pulp was not involved. The patient presented with a maxillary protrusion and severely flared upper incisors. In the absence of genetic predisposition factors, the etiology of the malocclusion was deemed a developmental aberration secondary to the habitual lower lip trap.

DIAGNOSIS

Skeletal: Class II (SNA 88°, SNB 81°, ANB 7°), maxillary protrusion.

Dental: Class I / II molar, Class II canine, excessive overjet (11 mm), deep impinging overbite (80 %), protrusive upper incisors & proclined lower incisors.

Facial: Convex profile with lip incompetence and lower lip trap.

SPECIFIC OBJECTIVES OF TREATMENT

Maxilla :

- A - P : Reduce protrusion and restrain forward growth.
- Vertical : Maintain.
- Transverse : Maintain.

Mandible :

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

Maxillary Dentition :

- A - P : Retract incisors and hold the posterior segments.
- Vertical : Intrude incisors.
- Inter-molar Width : Slightly increase.

Mandibular Dentition :



Fig. 1 Pretreatment facial photographs



Fig. 2 Pretreatment intraoral photograph



Fig. 3 Pretreatment study models

Dr. Chris HN Chang, Director, Beethoven Orthodontic Center (middle)

Dr. Hao-Yi Hsiao, Lecturer, Beethoven Orthodontic Course (left)

Dr. W. Eugene Roberts, Consultant, *News and Trends in Orthodontics* (right)



Fig. 4 Posttreatment facial photographs



Fig. 5 Posttreatment intraoral photographs

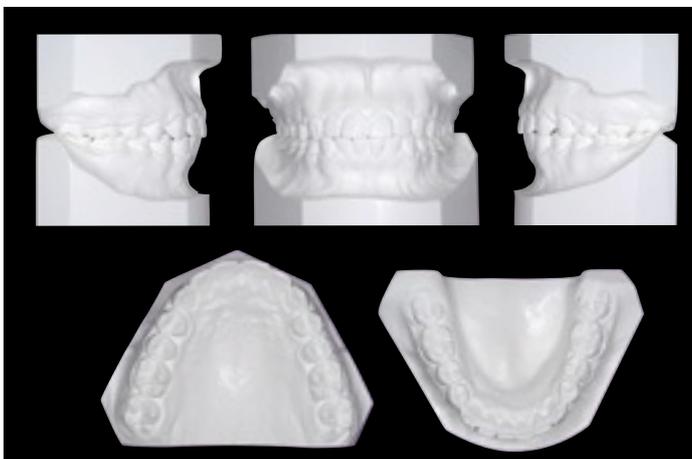


Fig. 6 Posttreatment study models

- A - P : Control incisor flaring.
- Vertical : Intrude incisors.
- Inter-molar / Inter-canine Width : Maintain.

Facial Esthetics : Improve facial appearance by decreasing the nasolabial angle and establishing lip competence.

TREATMENT PLAN

Non-extraction treatment with a full fixed orthodontics appliance was indicated to correct deep anterior overbite, maxillary protrusion, level the curve of Spee, coordinate the arches, and improve the soft tissue profile. The maxillary molars were banded and cervical-pull headgear was used to stabilize (hold) the upper molars. Brackets were bonded to maxillary incisors and a 2X4 utility archwire was used to intrude and retract them. The rest of the dentition was similarly bonded and lingual bite turbos were placed on the upper central incisors to correct the deep anterior overbite. Use of early light short elastics (2 oz) were applied to improve the jaw position. Use Class II elastics to achieve a Class I interdigitation and detail the occlusion. At the debonding visit, upper Hawley removable and lower 4-4 fixed retainers were delivered.

APPLIANCES AND TREATMENT PROGRESS

0.022-in Damon D3MX brackets (Ormco) were used. A cervical pull facebow headgear (Ormco) was inserted early in the treatment to hold the maxillary posterior segments. The patient was very cooperative and wore the headgear nine hours a day during the entire treatment time. In the 2nd month of the treatment, the maxillary incisors were bonded and a 16x22 utility archwire was used to intrude and retract the maxillary incisors. The rest of the dentition were bonded four months into treatment. Early light short elastics (2 oz) and upper anterior bite turbos were applied to encourage a more forward position the lower jaw. The wire sequences were as follows: .014 copper NiTi, .014X25 copper NiTi, .017X25 TMA and .019X25 SS. The Class II elastics were



Fig. 7 Pretreatment pano and ceph radiographs



Fig. 8 Posttreatment pano and ceph radiographs

progressively upgraded as follows : 2, 3, 4.5 and 6 oz. After two years of treatment, the severe overjet and deep bite were corrected. A panoramic radiograph was taken to evaluate axial inclinations relative to bracket positions. All four 2nd molars were bonded and four premolars brackets were repositioned according to the panoramic film. Up and down elastics (4 oz) were applied after placing .017x.025 TMA finishing archwires. The upper archwire was sectioned distal to the cuspids one month prior to the completion of treatment. Light up and down elastics (2 oz) were then used for final detailing. When treatment objectives were achieved, appliances were removed and retainers were delivered.

RESULTS ACHIEVED

Maxilla :

- A - P : Retracted.
- Vertical : Maintained normal growth pattern.
- Transverse : Maintained.

Mandible :

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

Maxillary Dentition :

- A - P : Incisors retracted - molars maintained.
- Vertical : Decreased.
- Inter-molar Width : Increased.

CEPHALOMETRIC

SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA°	88°	85°	3°
SNB°	81°	80°	1°
ANB°	7°	5°	2°
SN-MP°	31°	31°	0°
FMA°	26°	26°	0°
DENTAL ANALYSIS			
U1 TO NA mm	11 mm	4 mm	7 mm
U1 TO SN°	126°	109°	17°
L1 TO NB mm	8 mm	5 mm	3 mm
L1 TO MP°	97°	108°	11°
FACIAL ANALYSIS			
E-LINE (U)	8 mm	1 mm	7 mm
E-LINE (L)	5 mm	1 mm	4 mm

Table. Cephalometric summary

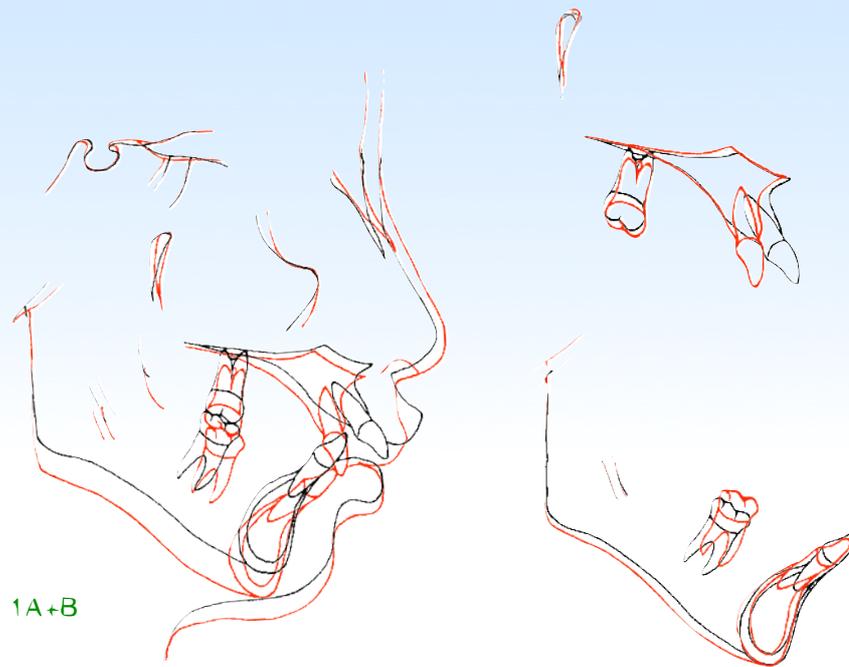


Fig. 9 Superimposed tracings

Mandibular Dentition :

- A - P : Maintained.
- Vertical : Increased.
- Inter-molar / Inter-canine Width : Increased / Maintained.

Facial Esthetics : Upper lip protrusion, acute nasolabial angle and lip incompetence were corrected.

RETENTION

The patient was instructed to wear an upper Hawley retainer full time for the first 6 months and nights only thereafter. The lower 4-4 fixed retainer was bonded on every tooth. The patient was instructed relative to home care and maintenance of the retainers. From the panoramic radiograph, it was apparent that there was inadequate room for the third molars, so it was recommended that all four be extracted.

FINAL EVALUATION OF TREATMENT

Wearing the cervical-pull headgear as instructed was the key to success for this case. This extraoral anchorage allowed for maximal retraction of upper incisors, which significantly improved the facial balance. Normal growth of the nose decreased the relative prominence of the lips and further helped improve facial harmony. The reduced, but still presented, Class II skeletal relationship required camouflage in the final position of the incisors : upper more retracted (upright) and lower more proclined (increased axial inclination). This camouflage effect was

achieved by the extensive application of Class II elastics. This side effect could have been prevented by using orthobonescrews in the mandibular buccal shelf to retract the lower incisors and to secure the Class II elastics in order to prevent molar extrusion. Another option would be use of low or no torque anterior brackets from the beginning of treatment. Overall, the growth of maxilla was successfully restrained to allow optimal correction of the protrusion. Good skeletal, dental and soft tissue outcomes were achieved. The prognosis for stability is good, and the corrections are expected be maintained with proper retention cooperation.

DISCUSSION

In diagnosis and treatment planning of a Class II malocclusion, there are many factors to consider : Is the patient a child or an adult? What is the facial pattern? Is the face hypodivergent or hyperdivergent? Are there soft tissue aberrations? Answering these questions provides a database for formulating treatment objectives and planning the biomechanics needed to achieve an optimal result.

Because this was a growing patient, we utilized growth modification. The diagnosis was skeletal Class II with maxillary dental protrusion, we used headgear to modify maxillary position by altering its normal downward and forward growth pattern. The choice of headgears depends upon the vertical pattern of the patient



Fig 10. Posterior bite turbos for correction of #2 buccal crossbite



Fig 11. Posterior bite turbos



Fig 12. Anterior bite turbos



Fig 13. Bonding 4 second molars in 24th months

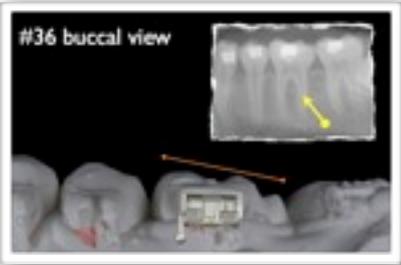


Fig 14. Check marginal discrepancy in finishing stage

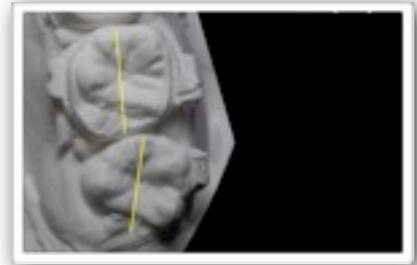


Fig 15. Check alignment in finishing stage

and the probable craniofacial growth pattern. In the present patient, the cervical headgear was chosen. In addition to its effect on holding the maxilla, it allows for full expression of mandibular growth. On the final superimposition, it is apparent that there was not enough horizontal mandibular growth to correct the Class II malocclusion. Therefore, it was necessary to use extensive Class II elastics which resulted in a clockwise (posterior) rotation of occlusal plane.

In the absence of good growth potential, a deepbite is a challenging problem to correct. In this case, bite turbos on upper incisors were used to correct the impinging deep bite. The side effect is the turbos also contributed to the posterior mandibular rotation. In retrospect, increased torque in upper incisor brackets and less torque in lower incisor brackets would have helped compensate for the Class II elastics side effects.

The long duration of the treatment in this case was due to waiting for the eruption of the second molars. Some may argue that treatment should be delayed until the second molars are erupted. Because of the fracture of upper left incisor as the result of flared incisors, it was decided to begin the treatment earlier. In retrospect, this was a wise decision because the patient had limited mandibular growth potential.

If there had been less expression of growth during treatment, it would have been necessary to extend the use of Class II elastics or extract maxillary first premolars.

In conclusion, this case demonstrates successful use of cervical headgear to modify maxillary growth and supplement molar anchorage. The use of maxillary anterior bite turbos and limited mandibular growth required extensive use of Class II elastics. The patient's soft tissue balance was improved by maximal retraction of the maxillary incisors.

Acknowledgements: Thank Tzu Han Huang and Dr. Grace Chiu to proofread this article.

REFERENCES

1. Proffit WR: *Contemporary Orthodontics*, edition 4. St Louis: Mosby, 2007
2. Graber TM, Vanarsdall RL, Vig K: *Orthodontics: current principles and techniques*, edition 5. St Louis: Elsevier, 2005
3. O'Reilly MT, Nanda SK, Close J: *Cervical and oblique headgear: A comparison of treatment effects*. Am J Orthod Dentofacial Orthop 1993;103(June):504-509

DISCREPANCY INDEX WORKSHEET

CASE # PATIENT MENG-WEI LIN
 TOTAL D.I. SCORE

EXAM YEAR 2009
 ABO ID# 96112***

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 =

OVERBITE

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

Total =

ANTERIOR OPEN BITE

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

Total =

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total =

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 =

OCCLUSION

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

Total =

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total =

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total =

CEPHALOMETRICS (See Instructions)

ANB $\geq 6^\circ$ or $\leq -2^\circ$ = 4 pts.
 SN-MP $\geq 38^\circ$ = 2 pts.
 Each degree $> 38^\circ$ _____ x 2 pts. = _____
 $\leq 26^\circ$ = 1 pt.
 Each degree $< -2^\circ$ _____ x 1 pt. = _____
 Each degree $> 6^\circ$ _____ x 1 pt. = 1
 Each degree $< 26^\circ$ _____ x 1 pt. = _____
 1 to MP $\geq 99^\circ$ = 1 pt.
 Each degree $> 99^\circ$ _____ x 1 pt. = _____

Total =

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 (≥ 3 mm) @ 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 ≥ 2 mm) @ 2 pts. = _____
 Tooth transposition _____ x 2 pts. = _____
 Skeletal asymmetry (nonsurgical tx) @ 3 pts. = _____
 Addl. treatment complexities _____ x 2 pts. = _____

Identify:

Total =

Exam Year	2009
ABO ID#	96112***

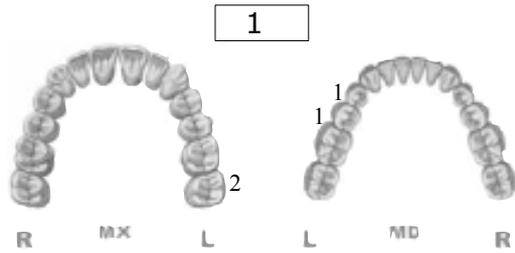
Examiners will verify measurements in each parameter.

ABO Cast-Radiograph Evaluation (Rev.6-1-08)

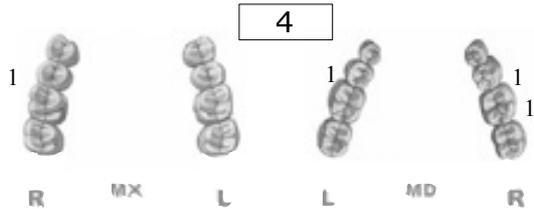
Case # Patient

Total Score:

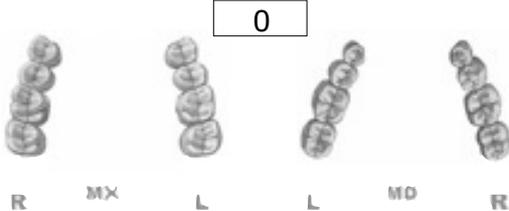
Alignment/Rotations



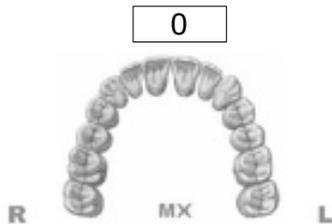
Marginal Ridges



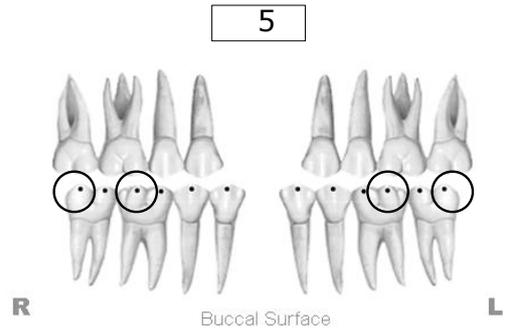
Buccolingual Inclination



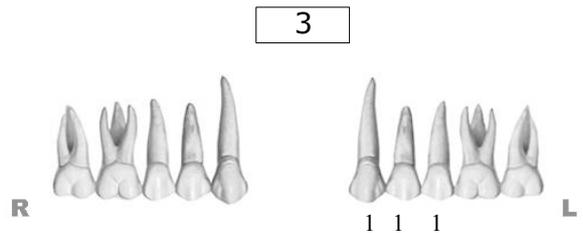
Overjet



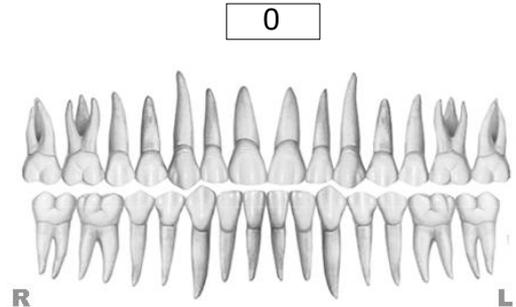
Occlusal Contacts



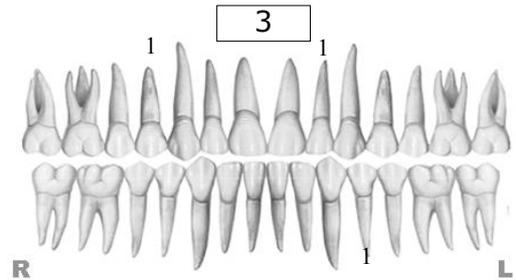
Occlusal Relationships



Interproximal Contacts



Root Angulation

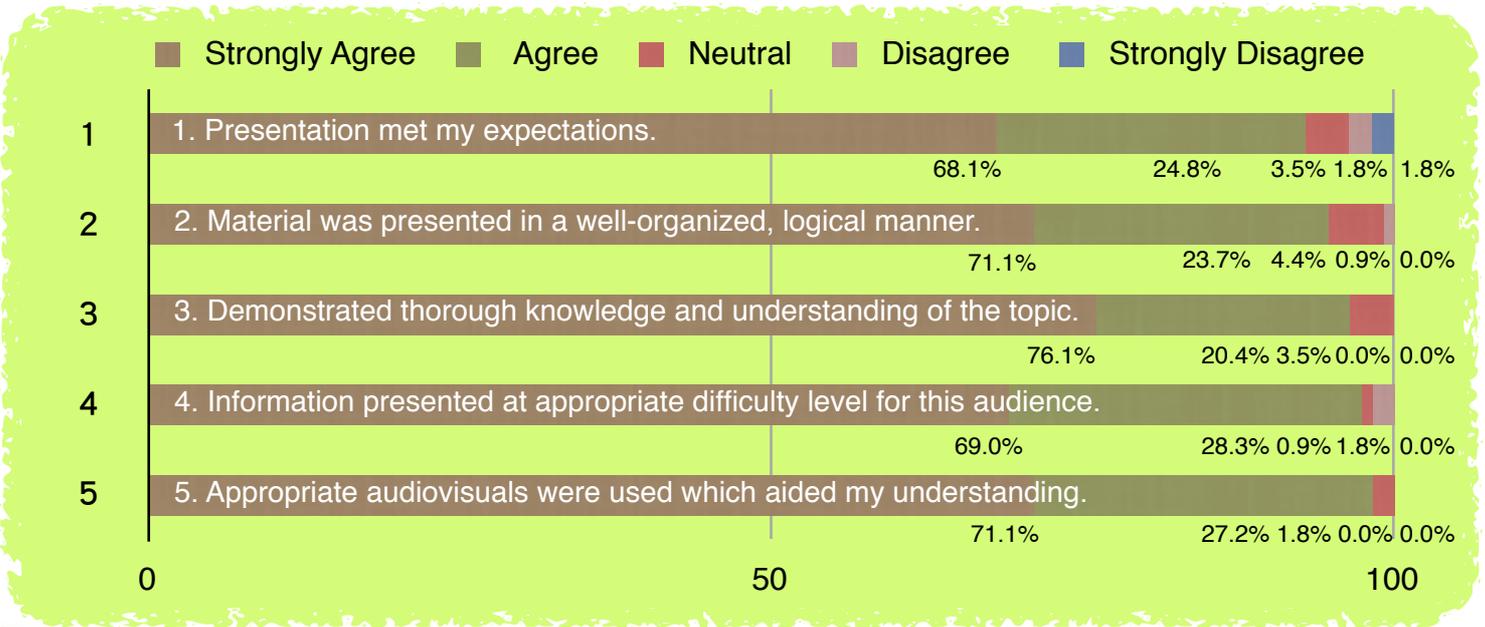


INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.



Are You a Good PRESENTER by the AAO Standards ?

The American Association of Orthodontists (AAO) annually invites accomplished orthodontists to present their practice and research in their highly anticipated convention. Each speaker is then evaluated by all attendees on the merits of presentation content and delivery. This year Dr. Chris Chang was first invited to attend as a speaker and his debut speech received an overwhelmingly positive feedback. Below is a list of evaluation guidelines by the AAO. We would like to invite anyone who is aspired to become an effective speaker to use this list and evaluate your own work.



Great presentation - keep him on the program. Great lecturer !
 Wonderful material !
 Stimulating presentation, good sense of humor.
 Very enthusiastic, Nice slides.
 Great audio visual support, clear, comprehensive. Well done !
 Excellent presentation !



Chris, just another congratulations on have never seen a more interesting and was dynamic, creative and innovative. do that ! Thanks again for a great gained from it, i.e., (don't buy a \$300 the teeth adjacent to the impacted one. I makes perfect sense. I will try to get an months.



Larry W. White, DDS, MSD
 Editor, Clinical Impressions
 Dallas, Texas

your presentation. It was splendid ! I captivating slide show in my life. It When I grow up I want to be able to display and also for the advice I book by Becker) and don't bond had never read that before, but it article to you within the next couple of

Larry White

ABO Case Report

A Class II Deep Bite Case

A 19-year and 2-month old Chinese girl was accompanied by her mother for evaluation of severe dental crowding. Oral soft tissues, frena, and gingival health were all within normal limits. There was no history of dental trauma, aberrant, oral habits or significant signs and symptoms of temporomandibular dysfunction

DIAGNOSIS AND ETIOLOGY

Pretreatment facial photographs showed a convex profile with slight asymmetrical appearance (mandible deviated to the right). The pretreatment intraoral photographs and study models revealed end-on molar Class II relationship on the right side, and a full cusp molar Class II relationship on the left side. The upper dental midline was 2 mm to the right of the facial midline. There was a 75% overbite, 14 mm of maxillary crowding, and 5 mm of mandibular crowding. Both maxillary second molars were full buccal crossbite and maxillary lateral incisors were in lingual crossbite. There was severe crowding in the maxillary (-15 mm) and the mandibular (-8 mm) arches. The panoramic radiograph revealed that both mandibular third molars were horizontally impacted.

Cephalometric analysis showed skeletal Class II relationship (SNA 83°, SNB 78°) and a normal mandibular plane angle. The ANB angle was 5°, and the SN-MP angle was 33°. The lower incisor to Md plane angle was 96°. The cephalometric values are summarized in the Table. The total score American Board of Orthodontics (ABO) of



Fig 1. Pretreatment facial photographs



Fig 2. Pretreatment intraoral photographs



Fig 3. Pretreatment study models

Dr. Chris HN Chang, Director, Beethoven Orthodontic Center (middle)

Dr. YL Hsu, Lecturer, Beethoven Orthodontic Course (right)

Dr. W. Eugene Roberts, Consultant, News and Trends in Orthodontics (left)



Fig 4. Posttreatment facial photographs



Fig 5. Posttreatment intraoral photographs



Fig 6. Posttreatment study models

Discrepancy Index was 22, as shown on the DI worksheet.

TREATMENT OBJECTIVES

The primary objectives of treatment were to attain Class I molar and canine relationships, achieve ideal overjet and overbite, and maintain pretreatment facial esthetics. Additional treatment objectives were to :

- Eliminate severe arch length discrepancy in both arches.
- Correct the anterior and posterior crossbite relationships.
- Reduce the curve of Spee.

For this patient, extraction of all four first premolars and four third molars was prescribed. Fixed labial appliances were bonded on both arches and lower posterior bite turbos were placed on the lingual surface of the maxillary first molars. Once the bite was opened with the anterior turbos, the buccal crossbite of the second molars were corrected with cross elastics. Miniscrews were placed on both sides of the infrazygomatic crest bilaterally to retract the upper posterior segments to attain Class I molar relationships.

TREATMENT ALTERNATIVES

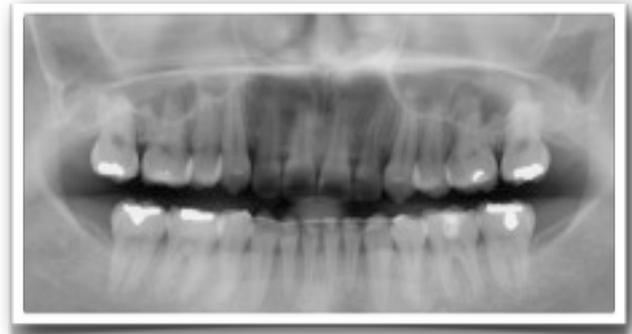
The main issue in determining an appropriate treatment plan was the severity of the dental crowding. It was recommended that the 4 first premolars be removed to alleviate the severe arch length discrepancy and facilitate correction to a normal canine relationship. A viable alternative would be extraction of maxillary first and



Fig. 7-8.
Pretreatment
pano and ceph
radiographs



Fig. 9-10.
Posttreatment
pano and ceph
radiographs



mandibular second premolars. That approach would simplify the correction of the molar relationship and result in less or no retraction of the mandibular incisors. In addition, maxillary posterior miniscrew anchorage would probably not be needed to correct the sagittal discrepancy.

TREATMENT PROGRESS

Two weeks after extraction, both arches were bonded with 0.018-in Inspire ICE brackets (Ormco). Occlusal bite turbos were placed on both lower 1st molars and lingual buttons were bonded on both lower 2nd molars were placed. Full time cross elastics (3 oz) were applied to 2nd molars to correct the crossbite. In the 5th month of treatment, posterior bite turbos were removed and anterior bite turbos were placed. The wire sequences were .014 copper NiTi, .016 copper NiTi, .016X.022 copper NiTi, .016X.022 SS. The Class II elastics were upgraded gradually as follows: 2 oz, 3.5 oz, 4.5 and 6 oz respectively. Spaces were closed by sliding mechanics with power chains on a .016X.022 SS wire. In the 30th month, two miniscrews (2X12 mm; stainless steel) on

CEPHALOMETRIC

SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA°	83°	81°	0°
SNB°	78°	78°	1°
ANB°	5°	3°	-1°
SN-MP°	33°	32°	1°
FMA°	26°	25°	1°
DENTAL ANALYSIS			
U1 TO NA mm	1 mm	1 mm	0 mm
U1 TO SN°	108°	108°	0°
L1 TO NB mm	4 mm	4 mm	0 mm
L1 TO MP°	96°	95°	1°
FACIAL ANALYSIS			
E-LINE (U)	-1 mm	0 mm	1 mm
E-LINE (L)	-1 mm	0 mm	1 mm

Table. Cephalometric summary

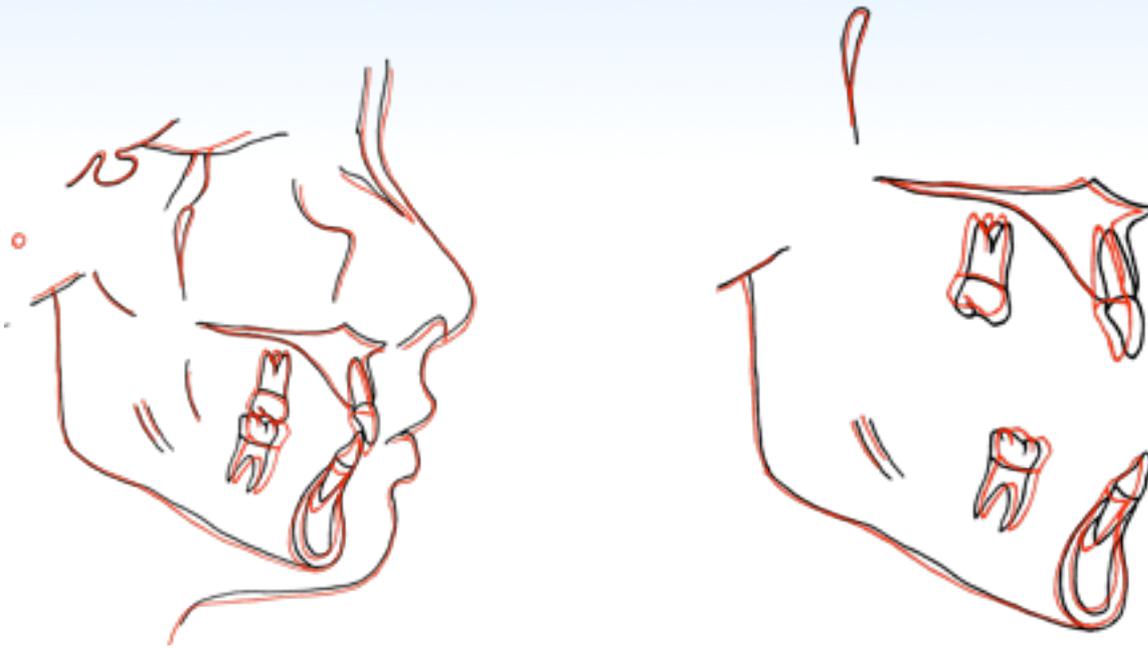


Fig 11. Superimposed tracings

both sides of the infrazygomatic crest were implanted to retract the upper posterior segment to achieve a Class I molar relationship. The upper archwire was sectioned behind the cuspids one month prior to the completion of treatment. Light up and down elastics (2 oz) were used for final detailing. Appliances were removed and an upper Hawley retainer was delivered. The lower fixed 5-5 retainer was bonded on every tooth.

TREATMENT RESULTS

The posttreatment photographs and dental casts show a satisfactory occlusion with bilateral Class I molar and canine relationships. The facial profile was improved by achieving lip incompetence. Both dental midlines were aligned with the facial midline. Ideal overjet and overbite were achieved.

Cephalometric analysis and superimpositions showed that the mandibular incisors were intruded 2 mm. The maxillary central incisors were slightly retracted but not

extruded. Critical assessment of treatment outcomes with current ABO outcome standards showed the following deviations from ideal:

1. The marginal ridge discrepancies exist between #19 & #20, and #30 & #31.
2. The Mandibular right second premolar exhibits excessive buccal root torque.
3. The buccal cusps of the maxillary canines, second premolars are shifted mesially about 1~2 mm relative to the interproximal embrasures of the mandibular posterior teeth.
4. The mesiobuccal cusps of the maxillary second molars shifted mesially about 1.5 mm to the buccal groove of the mandibular second molars.

The total score for the cast and panoramic radiograph grading system was 14, as seen on the Objective Grading System (OGS) worksheet¹. This score is well within the maximal allowable score of 26.



Fig. 12. 19 M during tx, ant. bite turbos



Fig. 14. 19 M during tx, 2~3 mm overbite



Fig. 13. cross elastics from U3 to L7s



Fig. 15. 19 M during tx, cross bite correction

FINAL EVALUATION OF TREATMENT

Full buccal crossbites in adults are difficult to correct. Posterior occlusal bite turbos and wearing of cross elastics as instructed were the keys to success for this case. The deep bite was corrected by leveling the arch with the assistance of anterior bite turbos. Superimpositions showed that the mandibular incisors were intruded 2 mm, and the maxillary incisors were slightly retracted. The inclination of the maxillary central incisors remained upright, which was due to insufficient

lingual root torque. This situation complicates the deep bite and Class II correction. The orthobonescrews provided powerful anchorage to distalize the posterior segment and helped achieve a Class I molar relationship. If the orthobonescrew skeletal anchorage was used earlier in the treatment sequence, it would have shortened the treatment time and facilitated the Class II correction. The deep overbite should have been overcorrected to help control relapse. From an esthetic point of view, the dark triangle between the maxillary central incisors should be

eliminated by tooth reshaping and space closing. Gingival recession was noted on #6, #10, #11 due to excessive brushing. Fortunately, those recessions are not apparent when the patient was smiles. Overall, significant improvement in occlusion and alignment was achieved. The facial esthetics and smiling dynamics were improved. The prognosis for stability is good, and the corrections should be maintained with adherence to the prescribed retention plan.

DISCUSSION

Deep bite is a common malocclusion that is difficult to treat successfully.¹ In this case the 6 mm overbite was improved to 3 mm after the treatment. However, overcorrection is highly recommended in order to prevent relapse. More complete correction of the deepbite would have been beneficial.

Correction of deep bite may involve maxillary incisor intrusion, mandibular incisor intrusion, mandibular incisor proclination, maxillary posterior tooth extrusion, mandibular posterior tooth extrusion, or an increase of the lower facial height.¹ According to the analysis of facial proportion, incisal display, and incisor inclination, it may be desirable to extrude molars, intrude lower incisors, and flare both upper and lower incisors.

Firstly, to attain molar extrusion, more vertical elastics could have been applied while using anterior bite turbos. Second, there are several ways to achieve incisal intrusion: utility arch combined with high-pull headgear, intrusive arch, J-hook headgear (J-HG), and orthobonescrews.² According to Deguchi et al, maxillary incisors were effectively intruded by using orthobonescrews as orthodontic anchorage without patient cooperation². In addition, the side effect of

incisor flaring caused by orthobonescrews further facilitates correction of the deepbite. One more thing to bear in mind is that when incisors are intruded, the force applied should be carefully calculated. Low forces should be used during intrusion to minimize root resorption and reduce side effects on the reactive unit.³ Third, the use of high torque brackets on upper incisors, an anterior pretorqued archwire and/or an anterior root torquing auxiliary can effectively flare both upper and lower incisors.

In review of this case, one should put more consideration on proper incisor inclination which would not only facilitate maxillary arch distalization but also improve the deep bite. The key to an effective and efficient treatment plan is to use orthobonescrews which can achieve substantial improvement of incisor inclination and proper molar relationships. However, the sagittal correction of the buccal segments would have been simplified by extracting mandibular second rather than first premolars.

ACKNOWLEDGEMENTS

Special thanks to our associate editors, Tzu Han Huang, Dr. Grace Chiu and Dr. Sabrina Huang for English revision.

REFERENCES

1. Christopher D, et al. Skeletal and dental changes associated with the treatment of deep malocclusion. *Am J Orthod Dentofacial Orthop* 1995;107:382-93.
2. Toru D, et al. Comparison of the intrusion effects on the maxillary incisors between implant anchorage and J-hook headgear. *Am J Orthod Dentofacial Orthop* 2008;133:654-60.
3. Bhavna S, et al. Segmented approach to simultaneous and space closure: Biomechanics of the three-piece base arch appliance. *Am J Orthod Dentofacial Orthop* 1995;107:136-43.

DISCREPANCY INDEX WORKSHEET

CASE # PATIENT Ya-Huei Fang
 TOTAL D.I. SCORE

EXAM YEAR	2009
ABO ID#	96112

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 =

OVERBITE

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

Total =

ANTERIOR OPEN BITE

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

Total =

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total =

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 =

OCCLUSION

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

Total =

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total =

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total =

CEPHALOMETRICS (See Instructions)

ANB $\geq 6^\circ$ or $\leq -2^\circ$ = 4 pts.

Each degree $< -2^\circ$ _____ x 1 pt. = _____

Each degree $> 6^\circ$ _____ x 1 pt. = _____

SN-MP

$\geq 38^\circ$ = 2 pts.

Each degree $> 38^\circ$ _____ x 2 pts. = _____

$\leq 26^\circ$ = 1 pt.

Each degree $< 26^\circ$ _____ x 1 pt. = _____

I to MP $\geq 99^\circ$ = 1 pt.

Each degree $> 99^\circ$ _____ x 1 pt. = _____

Total =

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 (≥ 3 mm) @ 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 ≥ 2 mm) @ 2 pts. = _____
 Tooth transposition _____ x 2 pts. = _____
 Skeletal asymmetry (nonsurgical tx) @ 3 pts. = _____
 Addl. treatment complexities _____ x 2 pts. = _____

Identify:

Total =

Exam Year 2009
 ABO ID# 96112

Examiners will verify measurements in each parameter.

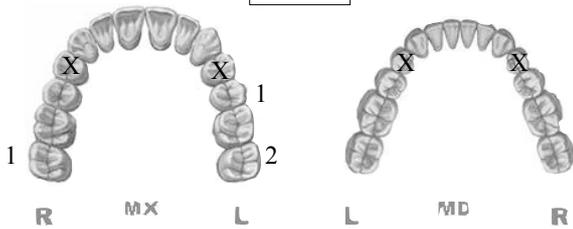
ABO Cast-Radiograph Evaluation (Rev.6-1-08)

Case # 5 Patient Ya-Huei Fang

Total Score: 14

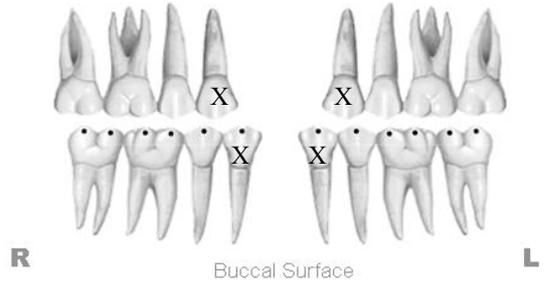
Alignment/Rotations

4

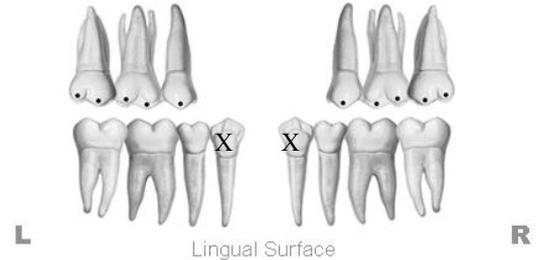


Occlusal Contacts

0



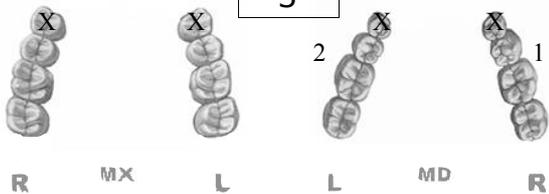
Buccal Surface



Lingual Surface

Marginal Ridges

3



1.

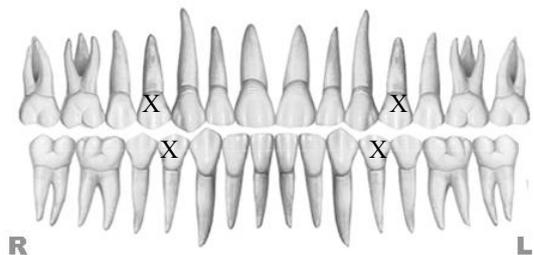
Occlusal Relationships

4



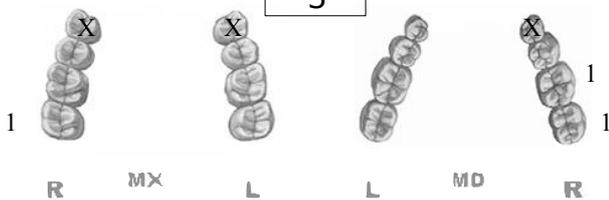
Interproximal Contacts

0



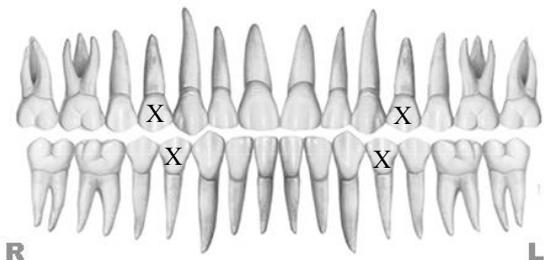
Buccolingual Inclination

3



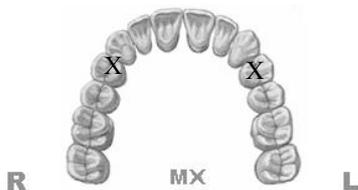
Root Angulation

0



Overjet

0



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

Dr. C. J. Burstone's Views on the Biomechanics of TADs



We were delighted to have Dr. Burstone back to Taiwan on Jan 3, 2009. As the father of modern orthodontic mechanics, Dr. Burstone shared his insights about the TADs. Below is a summary of his lecture.

With the introduction of temporary anchorage devices, certain complex mechanics we used before can be simplified in a simpler way. For example, a severely elongated molar which used to be solved only by posterior segmental osteotomy can be intruded with just a buccal and a palatal mini-implants. While TADs become more prevalent, many orthodontists oversimplify the force system of TADs. That's why Dr. Burstone, the father of modern biomechanics, wants to share his insights about TADs. He asserts that the orthodontists should gain more knowledge about the effects of the force system of the TADs and analyze the reactive force-and- moment to the TAD itself.

Before we get into the application of the TADs, there are four basic concepts we should remember:

1. Torque on implants:

Orthodontists are usually concerned with what TADs can do for us, and pay little attention to the force magnitude or the moment that TADs withstand. For example, when the intrusion arch are extended from a mini-implant, it will produce an intrusive force to the anterior dentition. It will also produce an extrusive force to the TAD itself and a rotation moment. If the direction of moment happens to be the same direction of unscrewing the TAD, this moment will become the loosening factor of the TADs (Fig. 1).

2. Equivalency:

A force can be divided into several components and still has the same effect. When we cannot directly exert force to the center of resistance, we can use this concept to achieve the result (Fig. 2).

3. Equilibrium:

This is Newton's first law. The sum of the vertical and horizontal forces should be zero. Also, the sum of the moments must be equals to zero.

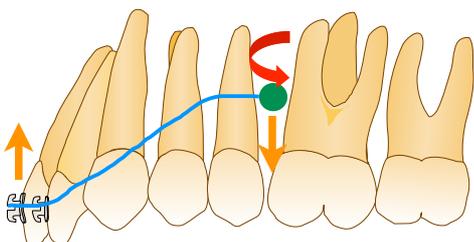


Fig. 1

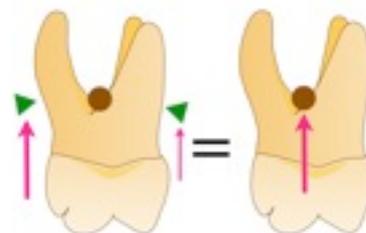


Fig. 2

Dr. Hao-Yi Hsiao

Lecturer, Beethoven Orthodontic Course



4. Straight wire effect:

When we use the straight wire to connect anterior and posterior segment of dentition, there will be an interactive function between both. Wire size, flexibility and friction all play roles in the final outcome of applying a straight wire.

● Fine Tuning Anterior Retraction

Using TAD as maximum anchorage to retract anterior dentition is the most common application of TADs. When anterior segment and posterior segment are not connected with a straight wire, the type of movement of anterior segment is determined by the position of the hook and TAD. If the force can pass through the center of resistance of anterior segment, the anterior dentition will be bodily translated backward. However, in some conditions, this line of action usually passes “under” the CR of anterior dentition. Therefore, a dumping moment is created (Fig. 3). In order to counter this moment and avoid the unwanted side effect, we can approximate the line to the CR of the anterior dentition by extending the hook apically. However, in other conditions, anatomical limitation could disable this buccal approach of TADs (Fig. 4). When this occurs, a lingual approach of TADs can be used to deliver the force close to the CR.

On the other hand, if we use a “flexible and thin” wire to connect anterior and posterior segment and retract anterior dentition from the TADs, the tipping moment on the anterior dentition may create a “ step bend ” force system on the straight wire, which will produce a mesial tipping moment on the posterior segment. That is the reason why many orthodontists have the problem of anchorage loss even with the usage of absolute anchorage. This is because the TADs are applied on a non-rigid wire, both of which together cause the dumping of anterior dentition, mesial tipping of posterior dentition and posterior open bite (Fig. 5).

When the extraction space are gradually closed or when the friction increases due to a heavier wire, the force starts to affect the whole dentition. In the situations above, the CR will relocate to the



Fig. 3

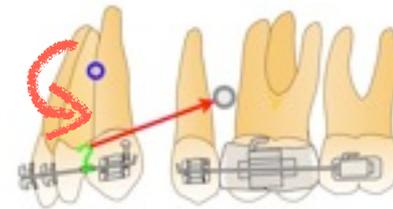


Fig. 4

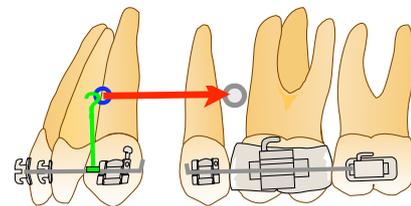


Fig. 5

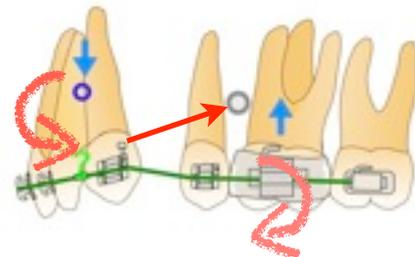
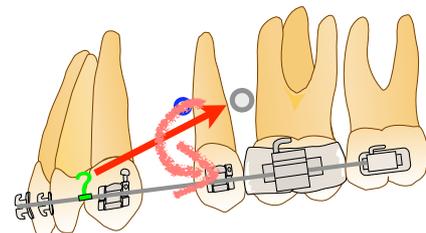


Fig. 6



more posterior area. Because the force still can't pass through CR, the occlusal plane will produce a "canting effect" and causes the bite deepened. In addition, the posterior dentition will be also intruded because of the application of the rigid wire (Fig. 6). Another side effects from the friction between the wire and the tube are molar rotation and buccal crossbite.

Dr. Burstone believes that when TADs are used as direct anchorage in combination with the straight wire system, it often causes unwanted side effects on the posterior dentition. Therefore, he recommends the use of extension arm, segment of the arch or using TADs as indirect anchorage to avoid side effects.

● **Fine Tuning Molar Distalization**

Exerting forces at the occlusal level to produce molar distalization often creates distal tipping of buccal segment rather than bodily translation. Sometimes mesial-out rotation and intrusion of the molars could happen. If the force vector is above center resistance of the molars, it will produce a tip-back effect of the molars. The advantage of exerting forces from TPA "palatally" is that it is close to the CR, while maintaining arch width and preventing molar rotation (Fig. 7,8). Dr. Burstone prefers to use 0.032 by 0.032 TMA or stainless steel wire to make TPA. He suggests leaving an extra length in front of the lingual hinge cap to avoid contact when distalization, and increase length of force reaction (Fig. 9,10 yellow arrow). With the different locations of the hooks and the TADs, we can design different tooth movement (See Fig. 9,10). Therefore, that is why Dr. Burstone suggests to use " removable TPA " in case orthodontists have to change the line of action during the treatment.

There is another issue about symmetrical force that needs to be considered. If the resultant force of bilateral force doesn't pass through CR, it will create unnecessary movement. With the analysis from the occlusal view, this asymmetrical force will produce arch skew (Fig. 11).

Fig. 7

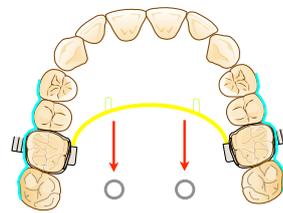


Fig. 8

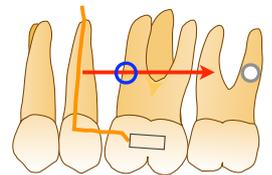


Fig. 9

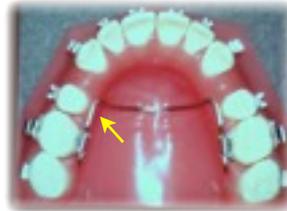


Fig. 10



Fig. 11

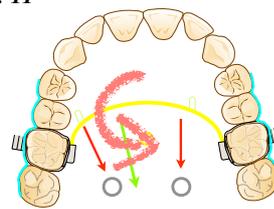
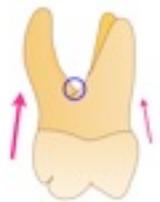


Fig. 12



● Fine Tuning Posterior Intrusion

With the use of TADs, we can intrude an individual tooth, a buccal segment or a full arch. Considering on single upper first molar, we need to know its CR of upper first molar. Where is the CR of the upper first molar? It is around the furcation area, close to the palatal root. Considering tooth morphology, the percentage found in palatal root is higher than buccal root (Fig. 12). Also, because of curve of Wilson, CR is located more palatally. Therefore, the force in the palatal side should be bigger than in the buccal side when intruding an upper molar. If we ignore this concept, the side effect of buccal crossbite will likely be created. Besides the components of buccal and palatal forces, we also need to be careful whether the resultants of mesial and distal force pass through CR to have an ideal result.

● Fine Tuning Posterior Protraction

Protracting the molar will work ideally if the force passes through CR by extending a power arm. In addition to buccal forces, a lingual force is also applied to prevent buccal rotation (Fig. 13). When the factors above are not considered, there will be the following side effects:

1. If the force is directly applied to the hook of the tube, the molar will tip and intrude due to the location of the TADs.

2. If a rigid continuous wire is used to connect anterior segment and the molar, the molar will be less likely to tip. However, friction will slow down the closure of the extraction space.
3. If a flexible continuous wire is used, the side effect will be tipping of anterior segment (Fig. 14).

● Fine Tuning Incisor Intrusion

Intrusion can be achieved by applying anterior TADs directly or by extending intrusion arch from the TADs indirectly. If the intrusive force is delivered from the latter method, one should be careful about the moment which may loosen the TADs.

● Conclusion

“ TAD doesn't simplify anything !! ” Dr. Burstone sincerely reminds us that orthodontists should think harder about the design of the force system in different situations to avoid side effects given the growing popularity of TADs.

Acknowledgements: Thanks to Dr. Grace Chiu for proofreading this article.

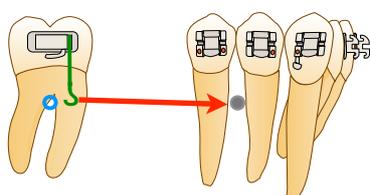


Fig. 13

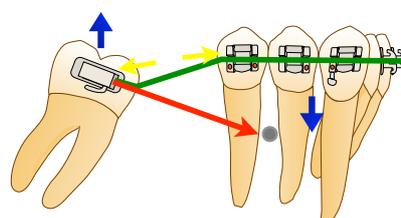


Fig. 14



Feedback from the 5th Beethoven International Damon and OrthoBoneScrew Workshop



The visit to Beethoven and Newton's A center of this time was really an eye-opening experience for me in many ways. Among others, what impressed me most was the attitude of staff members working so vividly knowing what they were expected to do. Of course, it must be the consequence of a superb office management system. A lot of time and effort must have been poured to establish the current status, which is well rewarded. Being inspired by the visit to Hshinchu, I have come back to my office with several new ideas to improve my own office system.

It was also a fun to get acquainted with some new friends from Thailand, Malaysia and Vietnam. Thank you very much for the wonderful and refreshing 2 days. I want to return some day with my staff members to show them how efficient an orthodontic office can be.

Thank you and see you again!



*Dr. Tomio Ikegami, Japan (middle)
the President of the Japan MEAW
Technique and Research
Foundation*



*Dr. Q (Pornchai), Thailand (middle)
Visiting professor, Prince of Songkla University
Faculty of Dentistry*



I met this crazy doctor (Dr. Chris Chang) in Taiwan this June. Why did I call him a crazy doctor ? Because he placed 47 OrthoBoneScrews and treated 140 patients in 2 periods of clinical time, which was about 7 hours altogether. That job surprised me! In this workshop I learn about what he thinks and how he manages the people surround him. If you want to see or learn a different way for your practice, go to Newton 's A and the Beethoven clinic.

Move out of your comfort zone. You can only grow if you are willing to feel awkward and uncomfortable when you try something new.



Larry W. White, DDS, MSD (right)

A highly regarded orthodontist and academic, has published over 100 professional articles, authored several books, and edited numerous professional publications.



3

I have received the majority of my computer training from reading training manuals, and unfortunately, this presents a poor and inefficient method of trying to learn a skill as sophisticated as computer technology. The time I spent with Chris Chang, Sabrina Huang and Bill Su at the 2009 Damon Forum represented a quantum leap in learning about the principles of Keynote Presentations. Nothing can compare with the one-to-one training these skilled people bring to an educational event. Keynote offers users a robust and innovative tool for relaying information in a clear and captivating manner. But to do this one needs the knowledge and expertise that only sophisticated teachers have. If one tries to use Keynote in the manner presented in most training manuals, it will not fully exploit the potential this unique presentation program has. However, if one receives the perception and support from exceptional teachers such as these three, Keynote suddenly seems limitless and exciting. Macintosh aficionados will save hours of turmoil and frustration by enlisting the help of teachers such as Chang, Huang and Su. They will bring real joy and pleasure to computer work.

Larry White

4

As a properly trained dentist in the field of implantology, I found it very difficult to be convinced that miniscrews can work as anchorage successfully as what have been presented by many famous speakers. I read Dr. John Lin's textbook over and over and was still not convinced until I attended this course. After observing Dr. Chris Chang's work closely and carefully in the past few days, case after case of OBS insertion and seeing direct responses from patients, I now am fully convinced that OBS is indeed a good way to prepare anchorage for certain cases in Orthodontics.



Dr. Hu Chang Lek, Malaysia

5

Thank you, Dr. Chris and your staff for your excellent course at Newton's A and Beethoven Clinic. You shared with us so many experiences not only in orthodontics but also in how to enjoy life and keep your passion forever burning. I feel much more confident and enthusiastic in my choice and hope to continue working with you.



Dr. Minh Phoung Nguyen, Vietnam (middle)

Fall 09' 課程表

類型	課程名稱	內容	開課日期	上課對象
入門推廣	Mac OS X 蘋果電腦新手入門	Mac OS X	9/6 (六) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iWork系列： 簡單上手的多媒體簡報	Keynote	8/15, 9/13 (六) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iWork系列： 整理表格數據的好幫手	Numbers	8/22 (六) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iWork系列： 製作個人化的印刷品	Pages	8/29, 9/27 (六) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iLife系列： 輕鬆剪輯精彩生活影片	iMovie+iDVD	9/5 (日) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iLife系列： 多采iPod影音生活	iPod + iTunes	8/16, 9/12 (日) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	認識蘋果世界裡的超好用小軟體	影音軟體	8/23 (日) 15:00~16:00	樂於嘗試生活科技應用者
入門推廣	iLife系列： 管理美好生活影像	iPhoto	9/26 (日) 15:00~16:00	樂於嘗試生活科技應用者
專業簡報	Keynote簡報法 series 3 掌握賈伯斯的演講祕訣	1. 簡報設計 2. 演說技巧	8月20日(四) 09:00~17:00	科技人、醫師、 教師、學生
臨床見習	牙醫生臨床見習營	1. 臨床觀摩見習 2. 蘋果科技在牙科之應用	8.13(四)-8.15(六)	全國牙醫系四升五學生
助理訓練	Damon助理訓練	1. 臨床操作技術 2. 牙科電腦科技	第一梯：8.21, 8.28 第二梯：10.23, 10.30	牙科助理
International	Damon and OBS workshop	1. Damon System 2. OrthoBoneScrew	9.18-9.20 10.19-10.21	Foreign Orthodontists

注意事項：上課期間欲租借教學用電腦，酌收維護費200元，可抵用店內消費。

上課地點：金牛頓藝術科技教育中心（交大華廈2樓）新竹市建中一路25號（巴士馬偕醫院下車步行5分鐘）

報名專線：03-5735676 黃小姐 金牛頓網頁：www.newtonsa.com.tw



ONE size fits
all

Ortho Bone Screw

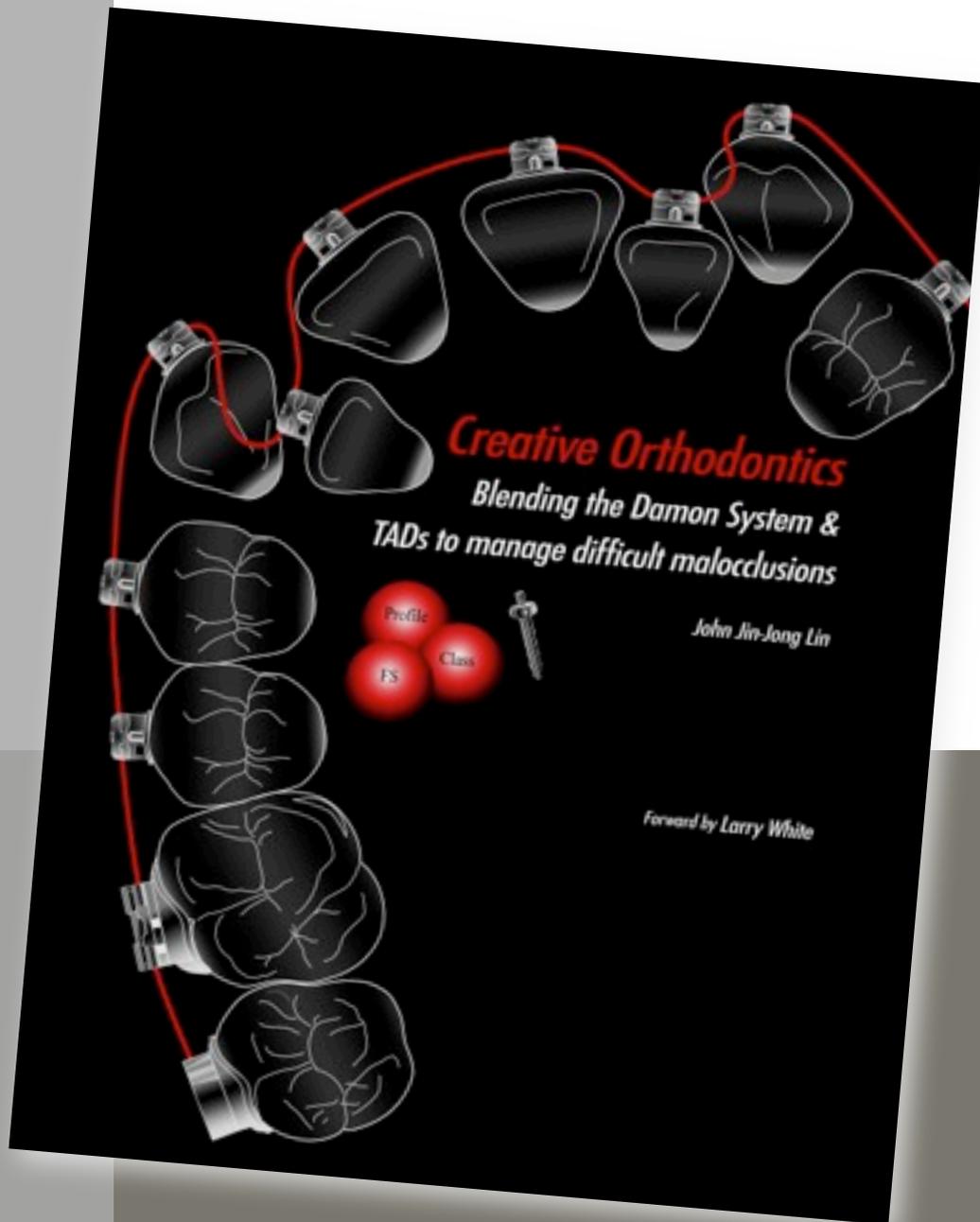


diameter	length	squared-hole	code
2 mm	12 mm	No	OBS 2.0
2 mm	12 mm	Yes	OBS 2.4

OBS 訂購專線：03-573-5676 呂小姐
金牛頓網頁：www.newtonsa.com.tw

“An excellent instructive and reference text for postdoctoral orthodontic students and specialist clinical orthodontists. Definitely recommended reading!”

—Alex Jacobson, associate editor of *AJODO*



2009 Beethoven 5th International OrthoBoneScrew and Damon Workshop