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Skeletal Class III Malocclusion with Anterior and Posterior Crossbite: Camouflage Treatment with Mandibular Second Molar Extractions and TSADs
Hsuan-Cheng Chu, Chris H. Chang & W. Eugene Roberts

Non-Extraction Treatment of Class III Malocclusion with Clear Aligners and Buccal Shelf Screws
Lily Y. Chen, Bear C. Chen, Chris H. Chang & W. Eugene Roberts

Lower First Molar Extraction to Treat a Class III Malocclusion with Three-Dimensional Problems
Daisy T. Lin, Lexie Y. Lin, Chris H. Chang & W. Eugene Roberts

Maximizing Spaces and Resources - Natural Habitat Aviary
Annie Chen

Dr. Chang had the honor and privilege to dine with his mentor (Dr. Eugene Roberts)'s mentor, Dr. Charles Burstone, in 2011, which was when his belief of the importance of published documentation was further cemented. Dr. Chang left the meal impressed by Dr. Burstone's reply to one of his questions: "It has been documented." Since then, the realization that solutions to orthodontic questions should be put down in words has been the motivation that drives Dr. Chang to document his findings to provide answers for all to use.

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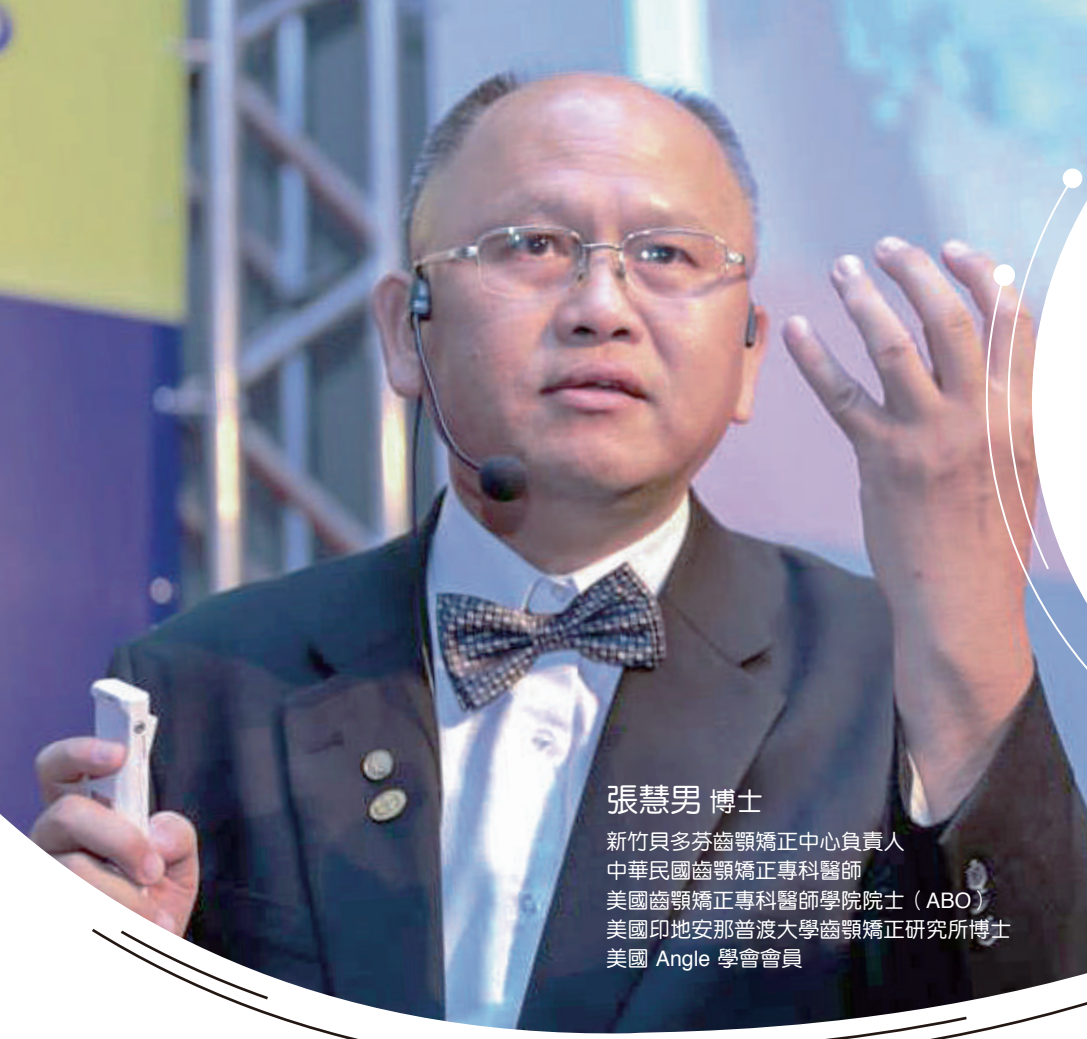

2022
熱愛學矯正

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

張慧男 博士

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

Damon Master

(Thu) 9:00-5:00 中文授課

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

Excellent Finishing

(Tue) 9:00-12:00 中文授課

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

International Workshop

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

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

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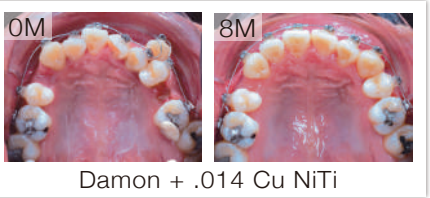
Module 2 -	4/28	7/14	Module 8 -	9/15	11/3
Module 3 -	5/12	7/28	Module 9 -	9/29	12/1
Module 4 -	6/2	8/4	Module 10 -	10/13	12/15
Module 5 -	6/16	9/1	Module 11 -	11/10	12/22
Module 6 -	7/21	9/22			

Finishing XIV

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



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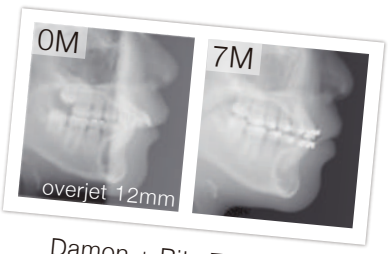

Damon + Bite Turbo +
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每次上課請依最新一期 JDO 公告為主

報名專線
湧傑 Yong Chieh

北區 楊文君 02-27788315 #122
中區 張馨云 04-23058915
南區 蔡淑玲 07-2260030

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

"It has been documented." - Dr. Charles Burstone, 2011

I am frequently asked where my enthusiasm for publishing orthodontic case reports comes from. Whilst contemplating this question, I have pondered deeply to try and determine the potential source of this drive and the significance of its importance. As is often the case, it is necessary to turn back the clock, by approximately 36 years, to the time when I began to learn orthodontics.

My main source of information during that pre-Google/internet era was the prestigious journal *American Journal of Orthodontics and Dentofacial Orthopedics* (AJO-DO). I sought relevant reports from AJO-DO to ascertain the answers to my questions. This was for me the most effective way, and those articles became my most loyal and trustworthy friends. I truly believe that published facts can help future generations of orthodontists to evolve in this profession.

My beliefs were further cemented in 2011, when I had the distinct honor and privilege to dine with my mentor (Dr. Eugene Roberts)'s mentor, Dr. Charlie Burstone (photo: cover page). I took advantage of this rare opportunity to pick his brain, and everything was going smoothly until I asked him a question and received a blunt answer: "It has been documented." I was deeply impressed by this answer, as it was in no way demeaning, but was rather an indication that the answer, in written form, was readily available. The questions I had previously asked, of which the answers were nowhere to be found, had probably ignited Dr. Burstone's interests, but for documented answers, his dessert was of more importance! I left the meal not only with answers to many questions, but also with the realization that solutions to orthodontic questions should be documented; you don't have to waste your time asking others, and others don't have to waste their time answering. Thank you, Dr. Burstone.

Furthermore, great masters, including Dr. Burstone, are but mere mortals, and their abilities to answer all kinds of difficult and miscellaneous questions leave with them, but their published papers remain. Therefore, from that day on I have diligently documented my findings to provide answers for all to use. This is the driving force behind my motivation. Anyone with the ability to search the internet can witness how solutions to problems are dealt with, especially in this technologically exciting era of orthodontics in Taiwan.

The three case reports in this issue all deal with severe Class III cases. It is generally believed that surgery is necessary to treat severe Class III cases. In fact, there are two cases that many orthodontists judged only surgery could solve. However, they were treated with conservative non-surgical methods. I think these are great examples of how documented answers show solutions could be found for cases that other thought were impossible.

Finally, there is an article I am currently most enthusiastic about - how to live your retirement. This chapter introduces the design of our aviary. After 36 years of marching along the path to glory, documenting and publishing my findings, I hope to be able to primarily enjoy the birdsong in my aviary, but will still have time for any orthodontic questions, for which no answer has yet been documented!

3 Editorial

CASE REPORT

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TAIWANESE LIFESTYLE THROUGH THE EYES OF CC

73 Chapter 6. Maximizing Spaces and Resources - Natural Habitat Aviary

Skeletal Class III Malocclusion with Anterior and Posterior Crossbites: Camouflage Treatment with Mandibular Second Molar Extractions and TSADs

Abstract

History: *An 18-year-8-month-old male was referred for orthodontic consultation with chief complaints of a prognathic mandible, anterior spaces, and open bite.*

Diagnosis: *Cephalometric analysis showed a skeletal Class III relationship with bimaxillary protrusion (SNA, 90˚; SNB, 92.5˚; ANB, -2.5˚). Clinical examination revealed a severe anterior crossbite (overjet = -5mm), an anterior open bite, bilateral lingual posterior crossbite, and full-cusp Class III molar relationship. There were small spaces between the anterior teeth in both arches. The mandibular dental midline deviated 1mm to the right. The chin shifted 3mm to the right. The Discrepancy Index for this severe skeletal malocclusion was 71.*

Treatment: *Bone screws were placed in the mandibular buccal shelves to retract the mandibular arch. Bilateral lower second molars were extracted to create posterior spaces for retracting the mandibular arch to correct the anterior crossbite. A Damon® system full-fixed appliance with passive self-ligating brackets was applied to correct the dental malocclusion. Early light Class III elastics were also used to facilitate the anterior crossbite correction. The posterior crossbite was a big challenge, which was resolved with cross elastics and careful archwire adjustment. The active treatment was 26 months. A surgical crown-lengthening procedure was performed to increase the esthetic outcome of the maxillary anterior teeth.*

Results: *After 26 months of active treatment, this severe skeletal Class III malocclusion was conservatively corrected to an excellent result without orthognathic surgery. The Cast Radiograph Evaluation was 31 points, and the Pink and White dental esthetic score was 1.*

Conclusions: *This case report demonstrates that the use of passive self-ligating appliances, lower second molar extractions, and buccal shelf screws can resolve a severe anterior negative overjet combined with an anterior open bite and lingual posterior crossbite without orthognathic surgery. (J Digital Orthod 2022;67:4-22)*

Key words:
Skeletal Class III, anterior crossbite, anterior negative overjet, anterior open bite, posterior crossbite, temporary skeletal anchorage devices (TSADs)

Introduction

Skeletal Class III malocclusion is more common among Asians than Americans and Europeans. The Chinese and Malaysian populations have a high prevalence of Angle Class III malocclusion, at 15.69% and 16.59%, respectively.[1]

Orthognathic surgery is one treatment option; however, the majority of patients in Taiwan decline surgery because of morbidity, potential complications, and expense.[2] As a result, treating a Class III malocclusion without surgery is a common approach for orthodontists in Taiwan. Using temporary skeletal anchorage devices (TSADs) as anchorage for lower arch retraction is often preferred.[3]

This case report documents an 18-year-8-month-old male patient who was referred by his dentist for

Hsuan-Cheng Chu
Training Resident, Beethoven Orthodontic Center (Left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)



orthodontic consultation. His chief complaints were a prognathic mandible, spaces between the adjacent anterior teeth, and no contact between the upper and lower front teeth. The pre-treatment facial and intraoral photographs are documented in Fig. 1.

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

When examining the oral condition, a severe negative overjet (OJ = -5mm) and bilateral lingual posterior crossbite indicated this was a challenging malocclusion.

The patient was informed that surgery was a conventional treatment option, but he regarded this approach as being too aggressive. Therefore, he wanted a non-surgical treatment, which made the challenging task even more difficult. After a thorough clinical data analysis, some camouflage treatment options were carefully planned. After discussing the pros and cons with the patient, he chose the treatment protocol which involved mandibular 2nd molar extractions and the use of TSADs. After 26 months of active treatment, an excellent result was achieved.

Fig. 2: *Pre-treatment cephalometric radiograph*

Diagnosis

The cephalometric analysis (Fig. 2; Table 1) revealed a skeletal Class III malocclusion (ANB, -2.5˚) with bimaxillary protrusion and markedly protrusive mandible (SNA, 90˚; SNB, 92.5˚). The mandibular plane angle (SN-MP, 27˚; FMA, 20˚) was relatively flat but within normal limits (WNL). The angle of lower incisors (91˚) was also WNL, but the upper incisors had an increased axial inclination (116.5˚). The facial profile was concave (G-Sn-Pg', 0.5˚) with a relatively retrusive upper lip (-3mm to the E-line) and a protrusive lower lip (6mm to the E-line). An increased vertical dimension of occlusion (%FH: Na-ANS-Gn, 57%) was evident, but there was no functional shift.

CEPHALOMETRIC SUMMARY

SKELETAL ANALYSIS	PRE-TX	POST-TX	DIFF.
SNA˚ (82˚)	90˚	90˚	0˚
SNB˚ (80˚)	92.5˚	92˚	0.5˚
ANB˚ (2˚)	-2.5˚	-2˚	0.5˚
SN-MP˚ (32˚)	27˚	29˚	2˚
FMA˚ (25˚)	20˚	22˚	2˚
DENTAL ANALYSIS			
U1 TO NA mm (4 mm)	5.5	7	1.5
U1 TO SN˚ (104˚)	116.5˚	115˚	1.5˚
L1 TO NB mm (4 mm)	8	3	5
L1 TO MP˚ (90˚)	91˚	73˚	18˚
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-3	-1	2
E-LINE LL (0 mm)	6	2	4
Convexity: G-Sn-Pg' (13˚)	0.5˚	1.5˚	1˚
%FH: Na-ANS-Gn (53%)	57%	58%	1%

Table 1: *Pre-treatment and posttreatment cephalometric analysis*

The panoramic radiograph revealed that all four wisdom teeth had already erupted and were reasonably well-aligned (Fig. 3). Pre-treatment plaster cast models showed a severe negative OJ (-5mm), bilateral lingual posterior crossbite, anterior open bite, mild spaces in upper and lower arches (maxilla: 3mm, mandible: 1mm), and bilateral beyond-full-cusp Class III molar relationship (Fig. 4). Temporomandibular joint (TMJ) morphology was normal in the open and closed positions (Fig. 5). There were no signs nor symptoms of temporomandibular dysfunction (TMD).

Compared to the facial midline, the lower dental midline was 1mm to the right. Oral hygiene was good. No significant medical or dental histories were reported.

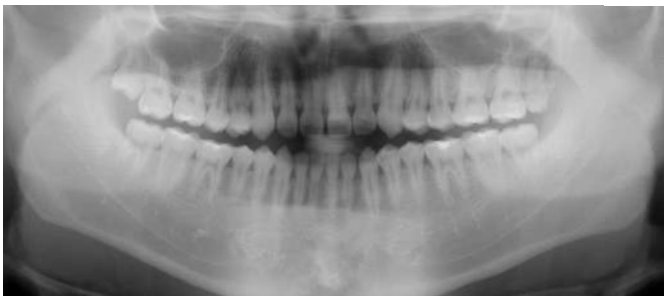


Fig. 3: *Pre-treatment panoramic radiograph*

Fig. 4: *Pre-treatment study models (casts)*

The American Board of Orthodontics (ABO) Discrepancy Index (DI) was 71 as shown in the subsequent Worksheet 1. The most significant problem was the anterior crossbite (40 points).

Treatment Objectives

The treatment objectives were to (1) correct the anterior crossbite, (2) close the spaces between the anterior teeth, (3) close the anterior open bite, (4) correct the posterior crossbite, (5) achieve Class I molar and canine relationships, and (6) improve facial esthetics.

Treatment Alternatives

Option 1. Orthognathic surgery is often indicated for severe Class III malocclusions. In this case, it was the option that could achieve the best treatment outcome; however, the cost and morbidity of orthognathic surgery caused the patient great concern.

Option 2. Extract mandibular 3rd molars for retraction, and use TSADs for anchorage. This option

Fig. 5 :
Pre-treatment TMJ transcranial radiographs are shown from left to right: right TMJ closed, right TMJ open, left TMJ open, and left TMJ closed.

has the advantage of preserving the stronger teeth, as the 2nd molars are generally more robust than 3rd molars. However, the disadvantage of this option is that it increases the difficulty of retracting the mandibular arch.

Option 3. Extract mandibular 2nd molars for retraction, and incorporate TSADs for anchorage. This option facilitates mandibular retraction, but the surviving 3rd molars are generally less preferred for longterm oral function. Fortunately, the present patient had well formed lower 3rd molars.

After a thorough discussion of the pros and cons for each approach, the patient chose option 3 as the most desirable camouflage treatment to avoid surgery. The patient provided informed consent for the treatment, knowing that this approach was challenging and that the outcome would be compromised. It was also suggested to extract the upper 3rd molars because they would not be in the occlusion after treatment.

Treatment Plan

Retract mandibular arch by extracting mandibular 2nd molars and installing TSADs. Extra-alveolar OrthoBoneScrews® (OBSs, 2x12-mm, iNewton Dental, Inc., Hsinchu City, Taiwan) are planned bilaterally in the buccal shelves to serve as anchorage for mandibular retraction. Correct the posterior crossbite by expanding the upper arch with a 0.016x0.025-in stainless steel (SS) archwire, as well as constrict the lower arch utilizing bilateral crossbite elastics. Finally, the posterior occlusion is to be detailed and seated with vertical elastics as necessary.

Treatment Progress

The archwire sequence is summarized in Table 2. Treatment progress is documented in the following views: right buccal, frontal, left buccal, upper occlusal, and lower occlusal, respectively (Figs. 6-10), and the detailed treatment mechanics are outlined in Table 3. From the following section onward, the nomenclature used is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). Teeth are number 1-8 from the midline.

A 0.022-in Damon® Clear™ and Damon® Q™ fixed appliance (Ormco, Brea, CA) with passive self-ligating (PSL) brackets was selected along with all specified archwires and orthodontic auxiliaries. In the beginning, brackets were bonded on all lower teeth except L7s and L8s. High torque brackets were placed on the lower canines, and low torque brackets were bonded upside down on the lower incisors. The purpose of this bracket selection was to provide more lingual root movement of the lower anterior teeth to offset the unwanted side effects of Class III elastics. For the same reason, low torque brackets were placed on the upper anterior teeth one month later. The initial archwire was a 0.014-in copper-nickle-titanium (CuNiTi).

In the following months, the sequence for upper archwires was 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS. Early light Class III elastics (Parrot, 5/16-in, 2-oz; Ormco) were used from U6s to L4s to correct the sagittal discrepancy from the 4th to the 6th months of treatment. In the 6th month, buccal shelf bone screws were installed bilaterally to anchor the retraction of the

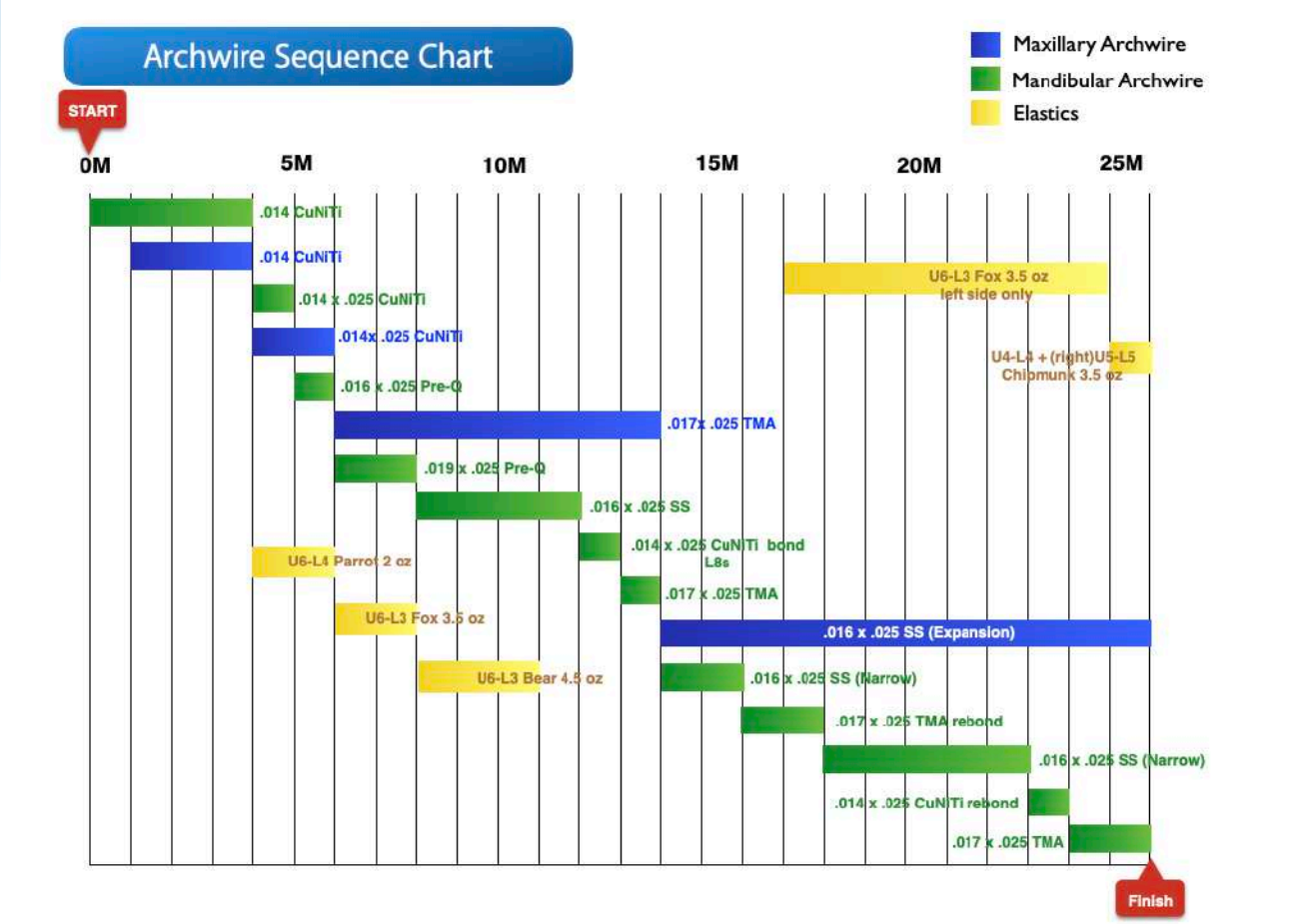


Table 2:
The archwire sequence chart is a treatment timeline for the procedures involved in managing the malocclusion: archwire changes, adjustments, and elastics. Posterior intermaxillary relationships were corrected with expansion and contraction adjustments. (Pre-Q: pre-toruqued, see text and Table 3 for details.)

mandibular dentition. In the 11th month, the anterior crossbite was already corrected. The sequence for the lower archwire in the first 11 months was 0.014 CuNiTi, 0.014x0.025-in CuNiTi, 0.016x0.025-in pre-torqued CuNiTi, 0.019x0.025-in pre-torqued CuNiTi, and 0.016x0.025-in SS. Then the L8s were bonded in the 12th month right after the anterior crossbite was corrected, and the lower archwire was changed back to 0.014x0.025-in CuNiTi. In the 13th month, buttons were bonded on the L4s and L8s to attach power chains for facilitating space closure, and the lower archwire was changed to 0.017x0.025-in TMA. In the 14th month, upper and lower archwires were changed to 0.016x0.025-in SS. At the same time, the upper archwire was expanded, and the lower archwire was constricted, in order to correct the posterior crossbite. Thereafter, the sequence for the lower archwire was changed back and forth due to repositioning of brackets several times. The sequence was 0.017x0.025-in TMA, 0.016x0.025-in SS, 0.017x0.025-in TMA, 0.016x0.025-in SS, 0.014x0.025-in CuNiTi, and 0.017x0.025-in TMA.

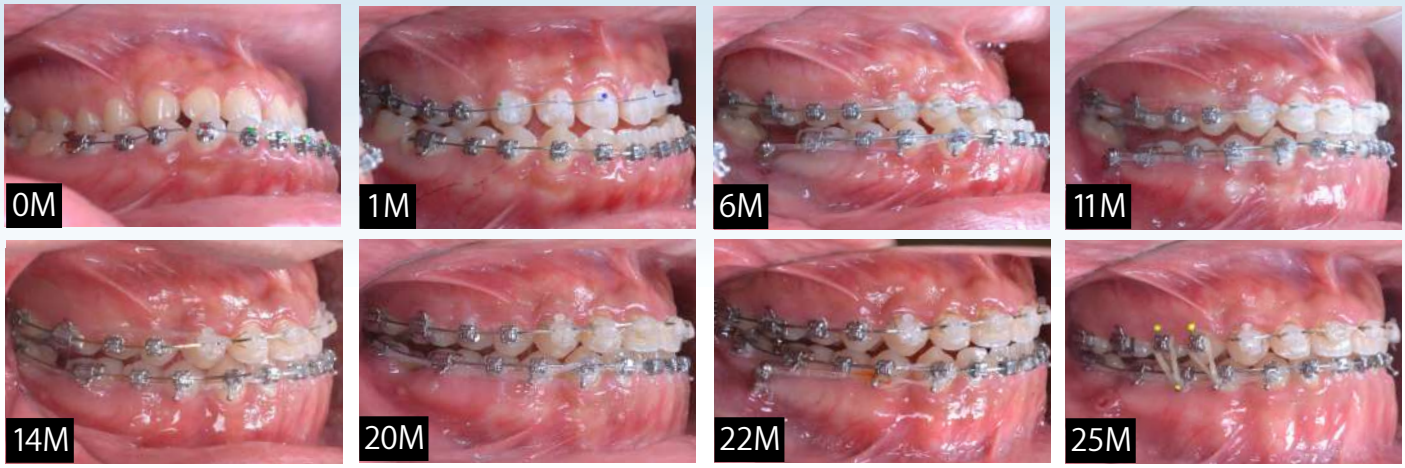


Fig. 6: Treatment progression from the right buccal view is shown from the start (0M) to twenty-five months (25M) of treatment.

Fig. 7: Treatment progression from the frontal view is shown from the start (0M) to twenty-five months (25M) of treatment.

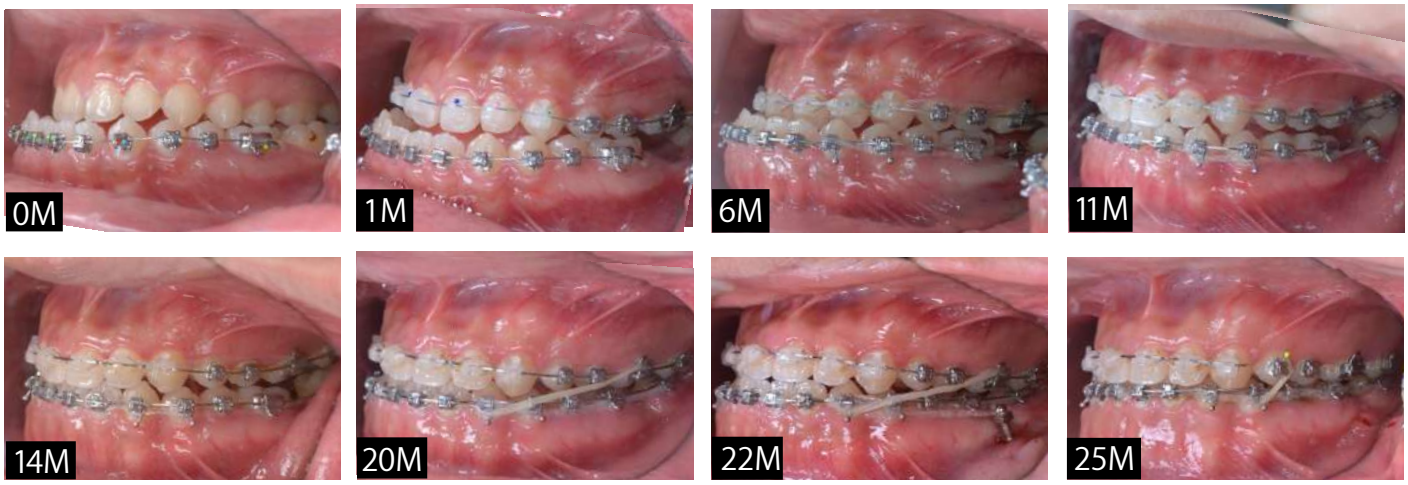


Fig. 8: Treatment progression from the left buccal view is shown from the start (0M) to twenty-five months (25M) of treatment.

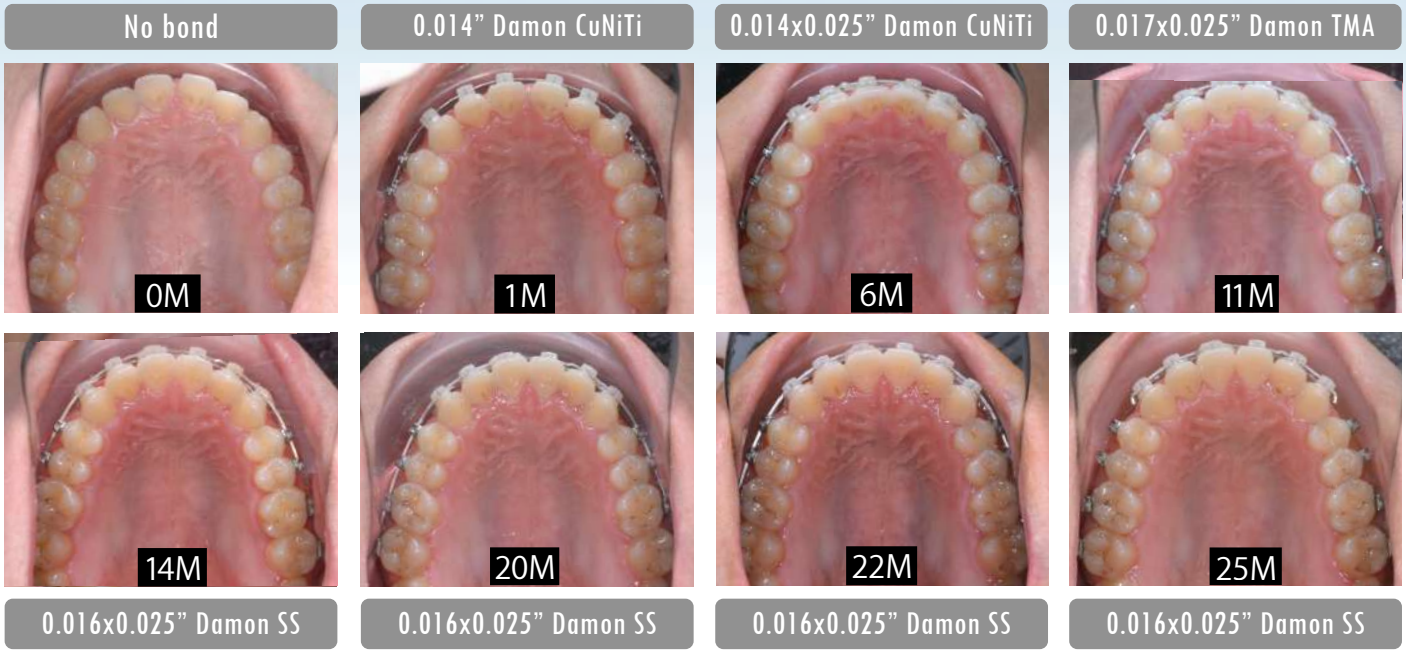


Fig. 9: Treatment progression from the maxillary occlusal view is shown from the start (0M) to twenty-five months (25M) of treatment.

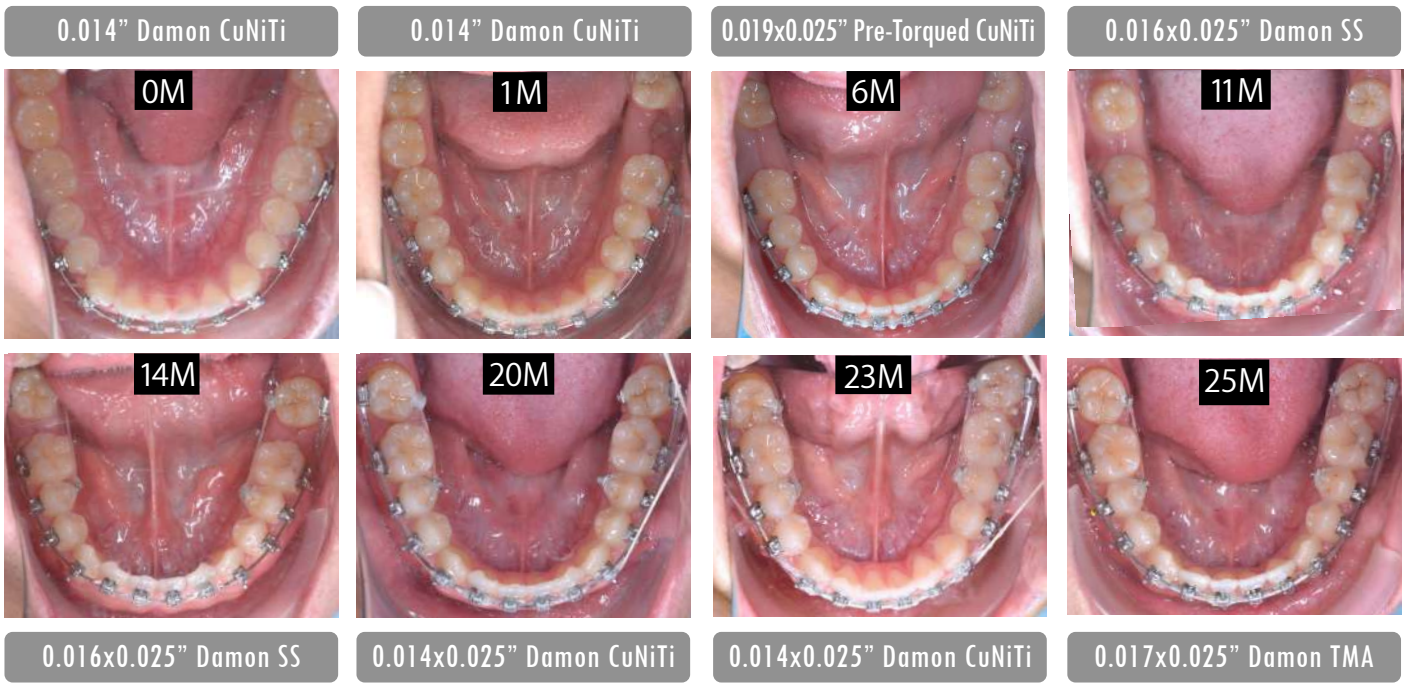


Fig. 10: Treatment progression from the mandibular occlusal view is shown from the start (0M) to twenty-five months (25M) of treatment.

Appointment	Archwire	Notes
1 (0 month)	L : 0.014-in Damon CuNiTi	Bond lower teeth except L7s and L8s. L7s will be extracted. High torque brackets were selected.
2 (1 month)	U: 0.014-in Damon CuNiTi	Bond all upper teeth. Low torque brackets were selected.
3 (2 months)		Observation
4 (3 months)		Rebond UL5 to adjust tooth position.
5 (4 months)	U: 0.014x0.025-in Damon CuNiTi L : 0.014x0.025-in Damon CuNiTi	L7s were extracted. L8s remained unbonded. Start using early light short Class III elastics (Parrot, 5/16-in, 2-oz) from U6s to L4s to retract mandibular anteriors.
6 (5 months)	L : 0.016x0.025-in Damon Pre-Torqued CuNiTi	Use pre-torqued archwire in the lower arch to compensate for side effects of Class III elastics.
7 (6 months)	U: 0.017x0.025-in Damon TMA	Class III elastics (Fox, 1/4-in, 3.5-oz) were used from L3s to U6s to retract the lower anteriors.
8 (6 months & 2 weeks)	L : 0.019x0.025-in Damon Pre-Torqued CuNiTi	Change to stronger pre-torqued archwire in the lower arch to further control the side effects of Class III elastics. Install two buccal shelf (BS) screws as the anchorage for retracting the lower arch. Place power chains from screws to lower canines to provide retraction force.
9 (7 months)		Change power chains for new ones to provide retraction force. The negative overjet was alleviated from -5mm to -3mm.
10 (8 months)	L: 0.016x0.025-in Damon SS	Class III elastics (Bear, 1/4-in, 4.5-oz) were used from L3 to U6 bilaterally to retract the lower anteriors.
11 (9 months)		Change new power chains to provide retraction force.
12 (10 months)		Build bite turbo on the lingual side of the lower incisors to facilitate overjet correction. The negative overjet was corrected to only -0.5mm.
13 (11 months)		The negative overjet (anterior crossbite) was corrected. Remove Class III elastics.
14 (12 months)	L : 0.016x0.025-in Damon Pre-Torqued CuNiTi	Rebond LR1, LR2, and LL1 to adjust tooth position.
15 (12 months)	L : 0.014x0.025-in Damon CuNiTi	Bond LR8 and LL8. Start to adjust L8s. Place a new archwire in the lower arch to engage all lower teeth. Remove BS screws because they interfered with the placement of new archwire.
16 (13 months)	L: 0.017x0.025-in Damon TMA	Place buttons on L5s and L8s. Place power chains between L5 and L8 buttons for space closure. Rebond LR1 to adjust tooth position.

Table 3: *Treatment sequence for all procedures is outlined in detail.*

Appointment	Archwire	Notes
17 (14 months)	U: 0.016x0.025-in Damon SS L: 0.016x0.025-in Damon SS	Rebond button on LR8 and rebond LL2 for adjusting tooth position. Expand the upper arch and constrict the lower arch by adjusting the archwires. Add 15˚ lingual root torque on LL2-LR2 area of the lower archwire.
18 (15 months)		Close space with power chains.
19 (16 months)	L : 0.017x0.025-in Damon TMA	Rebond LR1. Rebond botton on LR5. Consolidation with continuous ligatures from LL3 to LR3 to prevent space opening. Add 15˚ lingual root torque on LL2-LR2 area of lower archwire. Start using Class III elastics (Fox, 1/4-in, 3.5-oz) from U6 to L4 (left side) to correct Class III malocclusion.
20 (17 months)		Rebond LR1.
21 (18 months)	U: 0.016x0.025-in Damon SS	Continue to expand the upper arch and constrict the lower arch. Continue to use Class III elastics (Fox,1/4-in,3.5oz) from UL6 to LL4 to correct Class III malocclusion.
22 (19 months)		Rebond button on LR8. Close space with power chains.
23 (20 months)	U: 0.014x0.025-in Damon CuNiTi L : 0.014x0.025-in Damon CuNiTi	Close space with power chains. Continue to use Class III elastics (Fox,1/4-in, 3.5oz) from UL6 to LL4 to correct Class III malocclusion.
24 (21 months)	L : 0.017x0.025-in Damon TMA	Close space with power chains.
25 (22months)		Close space with power chains. Add 10˚ buccal crown torque for LL5 and LR5 with a 3rd order bend. Re-install TSADs to correct overjet.
26 (23months)	L : 0.014x0.025-in Damon CuNiTi	Rebond LL8 and LR8.
27 (24months)	L : 0.017x0.025-in Damon TMA	Add 15˚ buccal crown torque for LL1, LL2, LR1, and LR2 with a 3rd order bend.
28 (25months)		Cut the upper archwire from U3s. Instruct patient to use intermaxillary elastics from the premolars to premolars to decrease posterior open bite.
29 (26months)		All appliances were removed. Anterior fixed retainers were bonded. Removable clear overlay retainers were delivered for both arches. Instructions were provided for home hygiene and maintenance of the retainers.

Table 3 (cont.): *Treatment sequence for all procedures is outlined in detail.*

Treatment Results

Both arches were well aligned in a Class I occlusion with coincided dental midlines (Figs. 11 and 12). The overjet was corrected from -5mm to 1mm, and the posterior crossbite was corrected. The posttreatment panoramic radiograph shows complete space closure with good root parallelism and no significant periodontal bone loss (Fig. 13). The L5s and L6s experienced mild root resorption. The posttreatment cephalometric radiograph documents the dentofacial correction of the profile and the occlusion .

The superimposed cephalometric tracings show three important changes: (1) the retraction of the lower molars as well as slight clockwise rotation (opening) of the mandible, (2) the retraction and

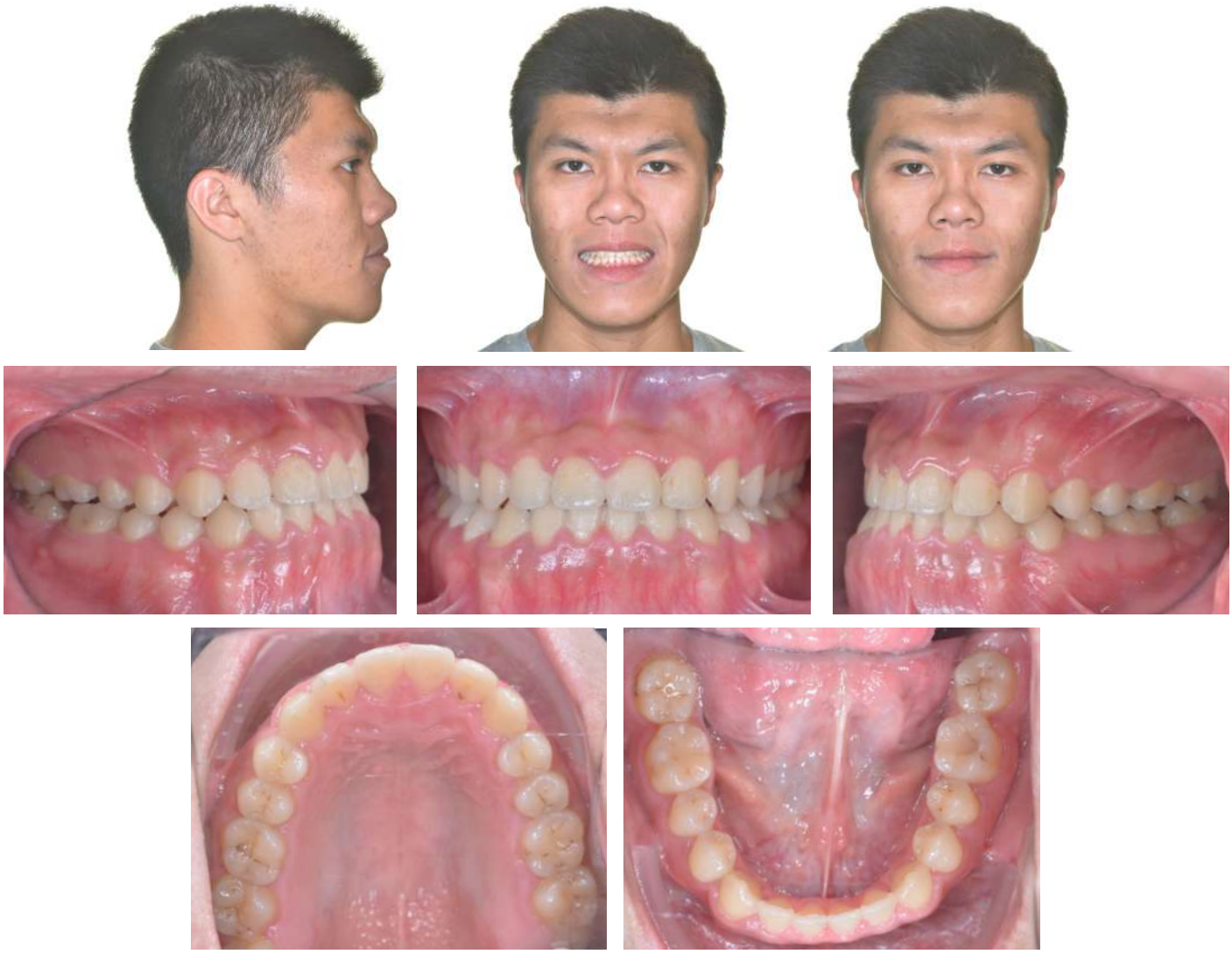


Fig. 11: *Posttreatment facial and intraoral photographs after 26 months of active treatment*

Fig. 12: Posttreatment study models (casts)

Fig. 13: Posttreatment panoramic radiograph

lingual tipping of the lower incisors, and (3) extrusion of the upper dentition (Figs. 14 and 15).

The ABO Cast Radiograph Evaluation score was 31 points, as shown in the supplementary Worksheet 2. The major discrepancies were a right side Class II occlusal relationship (11 points) and mild posterior open bite (8 points). This result is acceptable for such a challenging Class III skeletal malocclusion. Dental esthetics were good as indicated by the Pink and White dental esthetic score of 1, detailed in the supplementary Worksheet 3. This camouflage treatment was completed with 26

Fig. 14: Posttreatment cephalometric radiograph

months of active treatment, and the patient was well pleased with the outcome.

Retention

Fixed retainers were bonded on the lingual surfaces of all maxillary incisors and mandibular anterior teeth. Clear overlay retainers were delivered for both arches, and the patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions were also provided for oral hygiene and maintenance of the retainers.

Discussion

Skeletal Class III malocclusion with a severe anterior negative overjet is usually a clear indication for orthognathic surgery. On the other hand, the 3-Ring Diagnosis[5] developed by John Lin is an

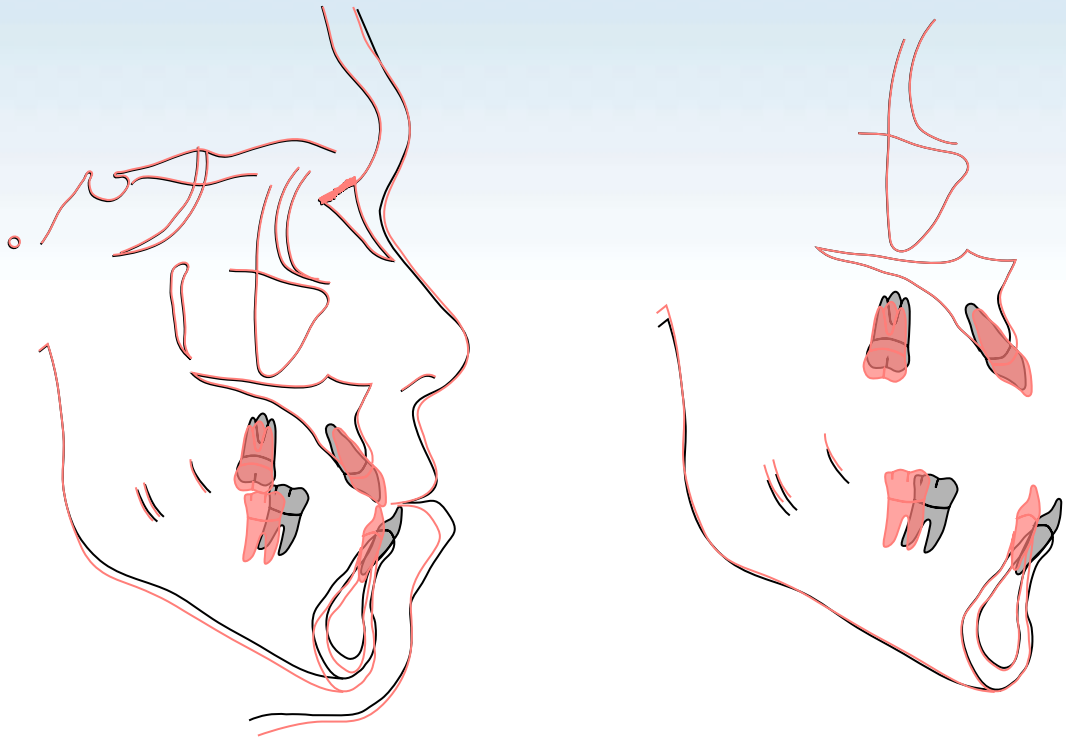


Fig. 15:
Cephalometric tracings are superimposed to show dentofacial changes from the start (black) to the end (red) of treatment. Superimpositions are made on the anterior cranial base (left), maxilla (upper right), and mandible (lower right). See text for details.

effective way for determining whether a Class III malocclusion can be corrected or at least substantially improved with a conservative treatment (Fig. 16). There are three good indicators for a non-surgical treatment: (1) orthognathic profile in C_R, (2) buccal segments that are approximately Class I, and (3) functional shift to C_O. As this patient only fitted one of these criteria (i.e., orthognathic profile), any conservative treatment would still be very challenging. In addition, the fact that his bilateral buccal segments were Class III greater than 10mm made the treatment even harder. Therefore, mandibular set-back surgery was first considered the most effective option to achieve the best treatment outcome. However, as previously mentioned, the patient refused surgery. In order to achieve Class I molar relationship and correction of the anterior crossbite, an 11mm space was required bilaterally. The patient had three molars in each quadrant, and this was good news as molar extraction could provide enough space needed for retracting the lower arch. Moreover, there were two other favorable factors: (1) a decreased mandibular plane angle, which provided more room for clockwise rotation of the mandible to make lower arch more retracted; and (2) a moderate open bite. Drawing from the discussion above, it was possible to treat the patient conservatively as long as he understood that it was a camouflage treatment which is subject to a compromised outcome.

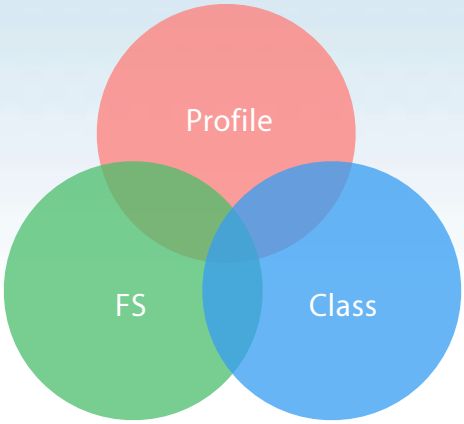


Fig. 16:
Lin's Three-Ring Diagnosis System assesses the potential for conservative correction of a Class III malocclusion with an anterior crossbite. Favorable factors are:

1. *Profile of the face is acceptable when the mandible is positioned in the centric relation (C_R);*
2. *Class I buccal segments in C_R; and*
3. *Functional shift (FS) is present from the C_R to centric occlusion C_O.*

1. Class III Mechanics

Class III camouflage treatment usually involves intermaxillary Class III elastics, which can result in increased axial inclination of the maxillary incisors and decreased axial inclination of the mandibular incisors,[6] particularly when there is an underlying Class III skeletal discrepancy.[7,8] Therefore, in order to counteract the unwanted side effects of Class III elastics, low-torque brackets were used on the upper anterior teeth to provide more buccal root movement. On the lower arch, low-torque brackets were bonded upside down on the incisors to deliver a high lingual root torque. Pre-torqued archwires were also used on the lower arch to increase the lingual root torque on the anterior teeth.

2. Extraction for Mandibular Arch Retraction

In this case, extraction spaces were dental compensation to permit lower arch retraction. The patient had fully erupted first, second, and third molars in all four quadrants. Usually, extractions in a Class III malocclusion are performed on either the premolars or the molars. For this patient, premolar extractions could not provide enough space to correct the severe anterior crossbite. Therefore, molar extractions were necessary. When determining which molars are most suitable for extraction, the rule of thumb is to choose the weaker teeth for extraction (e.g., caries, short roots, post-endodontic restoration, etc). However, all molars in this case were adequate for oral function, so the pros and cons are:

(1) First Molars: extracting first molars may permit anterior crossbite correction without the use of TSADs. But the disadvantages for this approach are that it is time-consuming, and that mandibular second molars have a tendency to tip mesially and lingually, requiring additional orthodontic mechanics.[9]

(2) Second Molars: second molar extractions are effective for correcting the anterior crossbite. However, severe malocclusions may require the anchorage of mandibular buccal shelf bone screws. This approach may be less time-consuming compared to first molar extractions.

(3) Third Molars: third molar extractions usually preserve more robust molars. However, this extraction pattern is not effective for correcting severe anterior crossbite, and mandibular

buccal shelf bone screws are often needed to help retract the lower arch.

3. Lingual Posterior Crossbite

When correcting a Class III malocclusion, lingual posterior crossbite is a common complication associated with lower arch retraction. This problem is even intensified when a lingual posterior crossbite is present. There are two strategies used for the present patient to manage this problem: (1) bond buttons on the lingual side of L5s and L8s so space closure mechanics can be implemented simultaneously on the buccal and lingual surfaces to prevent the lingual crossbite from deteriorating; and (2) design archwire compensation by expanding the upper archwire and narrowing the lower archwire.

4. Temporary Skeletal Anchorage Devices (TSADs)

TSADs were an important part of this treatment because it is very difficult to retract the whole lower arch using only the upper arch as anchorage. Compared to Class III elastics, the osseous anchorage of TSADs helps to avoid excessive upper incisor proclination.[10] The buccal shelf screws were placed buccal to the roots, not between the roots. Therefore, the entire mandibular dentition could be retracted since the buccal shelf screws do not interfere with root movements of the teeth.[11]

5. Anterior Open Bite

The center of rotation of the whole mandibular arch was well apical to the line of force from the TSAD to the anterior segment. The force retracting the arch created a moment around the center of rotation, which posteriorly rotated the entire arch. In effect, there was an extrusion of the anterior segment and a relative intrusion of the molars.[11] These mechanics are very useful for correcting severe Class III malocclusions with an anterior open bite.

Conclusions

Skeletal Class III malocclusion is a complex problem that requires a careful evaluation. Lin's 3-Ring Diagnosis System is very useful for determining whether the problem can be managed conservatively or not. For the present patient, retracting the lower arch was the key to managing the severe skeletal Class III malocclusion without surgery. In order to retract the whole lower dentition, tooth extractions were necessary. After a thorough discussion, both the practitioner and the patient agreed on extraction of the L7s. Therefore, management of space closure was an important issue. Absolute anchorage from TSADs provided crucial assistance for maximal retraction. Specific torque selection of the lower incisor brackets and a pre-torqued archwire offset the anticipated severe distal tipping of the lower incisors with space closure and Class III elastics.

Acknowledgment

Thanks to Mr. Paul Head for proofreading this article.

References

1. Jaradat M. An overview of Class III malocclusion (prevalence, etiology and management). J Adv Med Med Res 2018;25(7):1-13.

2. Lin JJ. Creative orthodontics blending the Damon System & TADs to manage difficult malocclusion. 2nd ed. Taipei, Taiwan: Yong Chieh; 2010. p. 263-71.

3. Tseng LL, Chang CH, Roberts WE. Diagnosis and conservative treatment of skeletal Class III malocclusion with anterior crossbite and asymmetric maxillary crowding. Am J Orthodo Dentofacial Orthop 2016;149(4):555-66.

4. Su B. IBOI Pink & White esthetic score. Int J Orthod Implantol 2013;28:80-85.

5. Yeh HY, Lin JJ, Roberts WE. Conservative adult treatment for severe Class III openbite malocclusion with bimaxillary crowding. Int J Orthod Implantol 2104;34:12–25.

6. Ferreira FPC, Goulart M de S, de Almeida-Pedrin RR, Conti AC de CF, Cardoso M de A. Treatment of Class III malocclusion: Atypical extraction protocol. Case Rep Dent 2017:ID 4652685.

7. Lin JJ. Creative orthodontics blending the Damon System & TADs to manage difficult malocclusion. 3rd ed. Taipei, Taiwan: Yong Chieh; 2017. p. 259-276.

8. Lin JJ. The most effective and simplest ways for treating severe Class III without extraction or surgery. Int J Orthod Implantol 2014;33:4-18.

9. De Ruellas AC, Baratieri C, Roma MB, Izquierdo A d M, Boaventura L, Rodrigues CS, Telles V. Angle Class III malocclusion treated with mandibular first molar extractions. Am J Orthod Dentofacial Orthop 2012;142(3):384-92.

10. Huang S, Chang CH, Roberts WE. A severe skeletal Class III open bite malocclusion treated with nonsurgical approach. Int J Orthod Implantol 2011;24:28-39.

11. Lin JJ, Liao J, Chang CH, Roberts WE. Orthodontics vol. III: Class III correction. 1st ed. Taipei, Taiwan: Yong Chieh; 2013. p.68-69.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 71

OVREJET

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

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

Total = 40

OVERBITE

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

Total = 0

ANTERIOR OPEN BITE

0 mm. (Edge-to-edge), 1 pt. per tooth
Then 1 pt. per additional full mm. Per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 8

CROWDING (only one arch)

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

Total = 0

OCCLUSION

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

Total = 12

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 7

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 4

OTHER (See Instructions)

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

Identify:

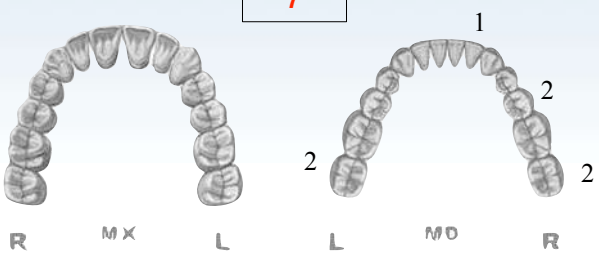
Total = 0

Cast-Radiograph Evaluation

Total Score: 31

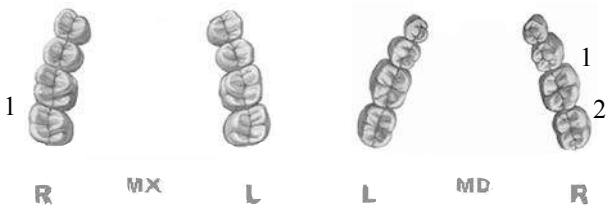
Alignment/Rotations

7



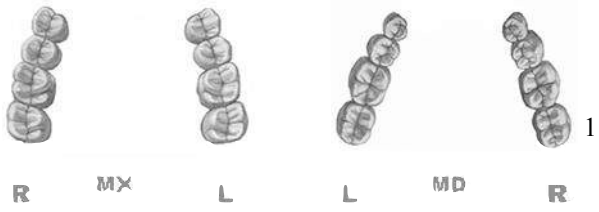
Marginal Ridges

4



Buccolingual Inclination

1

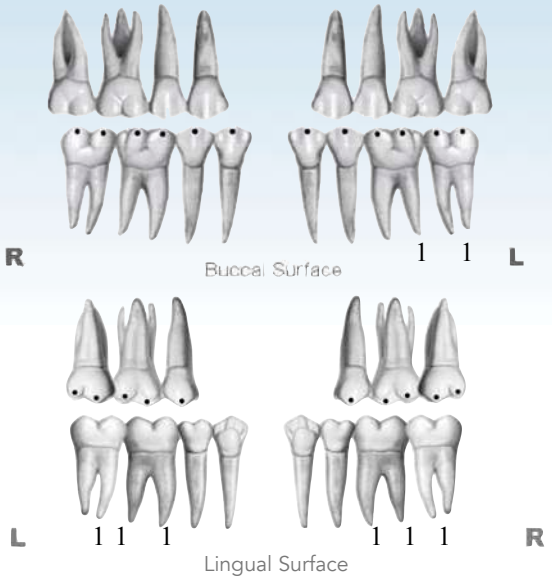


Overjet

0

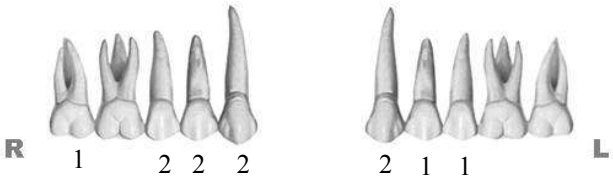
Occlusal Contacts

8



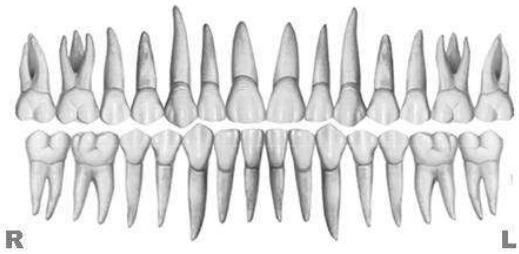
Occlusal Relationships

11



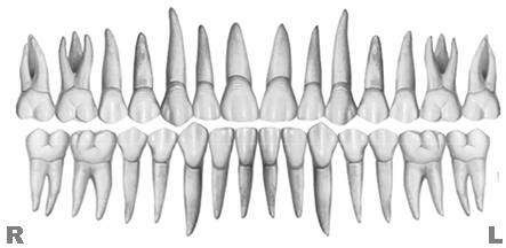
Interproximal Contacts

0



Root Angulation

0



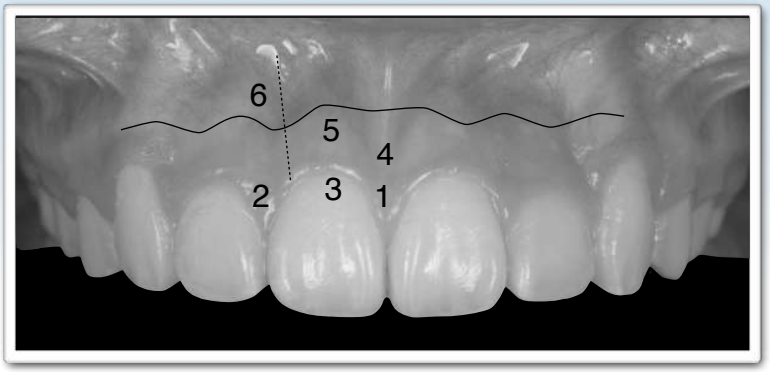
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 1

1. Pink Esthetic Score

Total = 0

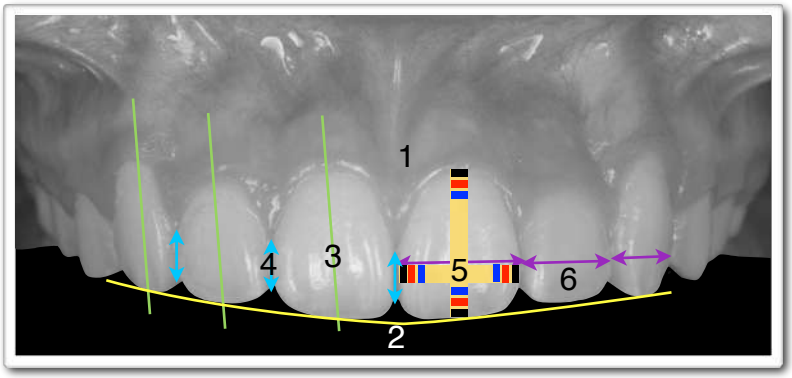


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 1



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

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

2022-2023 第十四年度

貝多芬 矯正精修班

時間：週二上午 09:00-12:00

地點：金牛頓教育中心（新竹市建中一路 25 號 2 樓）

上課日期：

2022　5/10、6/7、7/12、8/16、9/6、10/4、11/15、12/6

2023　1/10、2/7、3/7

- **09:00 ~ 10:00　精選文獻分析**
- **10:00 ~ 10:30　精緻完工案例**
- **10:50 ~ 12:00　臨床技巧及常犯錯誤分享**

全新的第十四年度 2022-23 貝多芬精修班，是由國際知名講師張慧男醫師主持，並偕同貝多芬牙醫團隊住院醫師群共同主講。

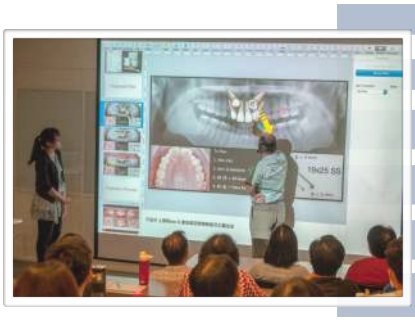
每月一次的課程之中，包含了：

1. 精選矯正權威期刊 AJODO 的文章做文獻分析與評讀。
2. 精緻完工 ABO 案例報告，其中因應數位矯正的世界趨勢，Insignia 與 Invisalign 病例為課程探討的主要內容之一。
3. 分享臨床上常犯的錯誤以及解決方法。

2022-23 貝多芬精修班內容豐富精彩，讓您經由每個月一次的課程，在面對各式的臨床案例時，更能游刃有餘、得心應手。

學習目的：

研讀最新趨勢文章可以窺知世界文獻公認的治療方式，而藉由評論文章的優缺點不僅能夠訓練判斷與思考能力，更可以清楚比較作法上的不同，達到完整理解治療方向、內容與穩定性的目標。



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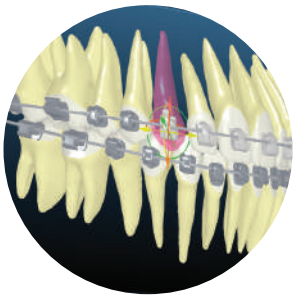

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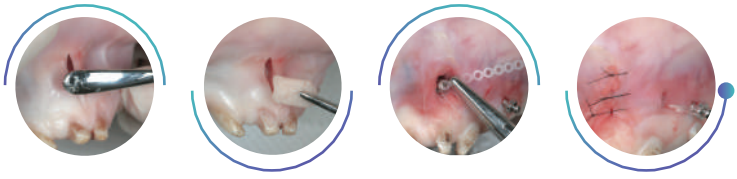

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Course Schedule

Day 1 **Chair–side observation**

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

Chris' Lecture:
Digital Orthodontics with TAD

Day 3 **VISTA Lecture & workshop**

Chris' Lecture:
VISTA for Impacted Cuspids

* The topics for VISTA workshop:

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

Prof. Dr. Paulo Fernandes Retto, Portugal

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

Digital Orthodontics, OBS & VISTA

Day 4 **Keynote workshop** (Optional)

by Newton's A team

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

Dr. Rungsi Thavarungkul, Thailand

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

KEYNOTE

THE LECTURER

Dr. Chris Chang

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

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2. 黃色點朝唇側/頰側，
將尾端彎折至矯正器凹槽內

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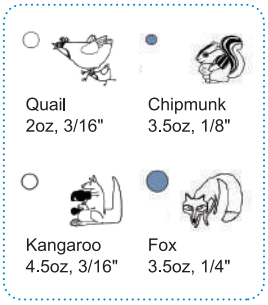

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Non-Extraction Treatment of Class III Malocclusion with Clear Aligners and Buccal Shelf Screws

Abstract

History: *An 18yr-9m-old male presented with a Class III malocclusion with negative overjet. His chief complaints were crowding and a protrusive lower lip. He previously rejected treatment with extractions or orthognathic surgery.*

Diagnosis: *The cephalometric analysis revealed skeletal Class III (SNA, 82˚; SNB, 85˚; ANB, -3˚), high mandibular angle, flared upper incisors, and retroclined lower incisors. An intraoral examination documented negative overjet, anterior crowding on both arches, and posterior buccal crossbite on U7s. The Discrepancy Index was 32 points.*

Treatment: *A camouflage, non-surgical approach without extractions was indicated. Buccal shelf (BS) bone screws (2x12-mm, OrthoBoneScrew®, iNewton, Inc., Hsinchu City, Taiwan) were used as anchorage to retract the mandibular dentition, and Class III elastics corrected the intermaxillary discrepancy. Inter-proximal reduction and arch expansion were prescribed in order to provide spaces for arch alignment.*

Results: *The facial profile was improved with a more balanced lip position. Torque control for the upper and lower incisors was excellent. After 28 months of active treatment, the skeletal Class III malocclusion was corrected to an excellent Cast-Radiograph Evaluation score of 24 points and a Pink & White dental esthetic score of 4.*

Conclusions: *When correcting skeletal Class III with camouflage treatment, spaces are usually provided through extraction, inter-proximal reduction, and/or arch expansion. However, buccal shelf bone screw anchorage combined with Class III elastics is a powerful weapon to retract the mandibular arch. (J Digital Orthod 2022;67:28-43)*

Key words:
Class III malocclusion, camouflage treatment, non-surgical treatment, buccal shelf screw, Class III elastics, clear aligner

Introduction

The dental nomenclature for this case report is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). Teeth are numbered 1-8 from the midline in each quadrant.

The prevalence of Angle Class III malocclusion varies among and within differing ethnic groups; however, it is most common among Asians.[1] Chinese and Malaysian populations have a high prevalence of Angle Class III malocclusions: 15.69% and 16.59%, respectively. In the United States, the prevalence of Class III malocclusions is only about 1% of the total population; nevertheless, it constitutes about 5% of all orthodontic patients.[2,3]

In general, Class III malocclusions can be treated by orthodontic camouflage treatment via temporary skeletal anchorage devices (TSADs) with elastics and/or by orthognathic surgery for skeletal correction. However, due to the morbidity, potential complications, and high expense, orthognathic

Lily Y. Chen,
Training Resident, Beethoven Orthodontic Center (Left)
Bear C. Chen,
Associate Director, Beethoven Orthodontic Center (Center left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center right)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

surgery is often declined by Asians. On the contrary, orthodontic camouflage treatment with TSADs is usually preferred.

This case report presents camouflage, non-extraction treatment of a Class III malocclusion using clear aligners. Despite research demonstrating limitations of aligners for correcting skeletal malocclusion,[4,5] advancement of

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

aligner material, artificial intelligence, TSAD anchorage, and a proper design of Class III mechanics resulted in a normal occlusion and a balanced esthetic profile.

Diagnosis and Etiology

An 18-yr-old male presented for orthodontic evaluation with chief complaints of crowding and a protrusive lower lip (Fig. 1). Medical and dental histories were non-contributory. Plaster casts revealed bilateral Class III canine and molar relationships (Fig. 2). The panoramic radiograph (Fig. 3) showed all four wisdom teeth were missing.

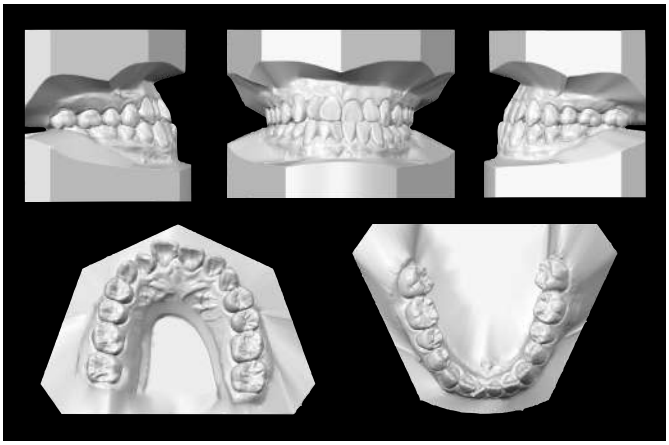


Fig. 2: *Pre-treatment study models*

Fig. 3: *Pre-treatment panoramic radiograph*

Cephalometric analysis (Table 1) revealed decreased facial convexity (G-Sn-Pg', 8˚) and a prognathic mandible (SNA, 82˚; SNB, 85˚; ANB -3˚) with a steep mandibular plane angle (SN-MP, 43˚; FMA, 36˚). The upper incisors were flared, and the lower incisors were retroclined (Fig. 4). Temporomandibular joint (TMJ) morphology was normal in the open and closed positions with no temporomandibular dysfunction (TMD) (Fig. 5). An intraoral examination revealed a negative overjet, anterior crowding in both arches, and posterior buccal crossbite on U7s (Fig. 1). The facial profile was nearly straight with a protrusive lower lip (5mm to the E-line). The

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-TX	POST-TX	DIFF.
SNA˚ (82˚)	82˚	81˚	1˚
SNB˚ (80˚)	85˚	83˚	2˚
ANB˚ (2˚)	**-3˚**	-2˚	1˚
SN-MP˚ (32˚)	**43˚**	44˚	1˚
FMA˚ (25˚)	**36˚**	37˚	1˚
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	8	7	1
U1 TO SN˚ (104˚)	**133˚**	106˚	27˚
L1 TO NB mm (4mm)	3	2	1
L1 TO MP˚ (90˚)	**69˚**	65˚	4˚
FACIAL ANALYSIS			
E-LINE UL (-1mm)	-1	0	1
E-LINE LL (0mm)	5	3	2
%FH: Na-ANS-Gn (53%)	57%	58%	1%
Convexity:G-Sn-Pg' (13˚)	8˚	3˚	5˚

Table 1: *Cephalometric summary*

Fig. 4: Pre-treatment cephalometric radiograph

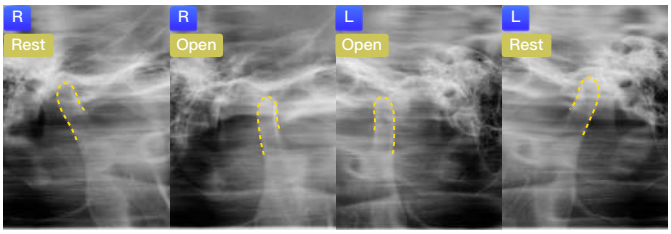


Fig. 5:
Pre-treatment transcranial radiographs of the right (R) and left (L) temporomandibular joints (TMJs) in rest and open positions. The mandibular condyles are outlined in yellow.

American Board of Orthodontics (ABO) Discrepancy Index (DI) was 32, as documented in the supplementary Worksheet 1.[6]

Treatment Objectives

1. Attain ideal overjet and overbite.
2. Achieve Class I canine and molar relationships.
3. Align both arches, and correct posterior crossbite.
4. Improve facial esthetics.

Treatment Alternatives

Option 1: A conservative, camouflage approach without extraction that retracts the mandibular arch with buccal shelf (BS) bone screw anchorage and Class III elastics. Create extra space to relieve crowding and retract the mandibular arch by performing 0.4mm inter-proximal reduction (IPR) on each tooth and expanding both maxillary and mandibular arches.

Option 2: Similar camouflage approach to option 1 adding two infrazygomatic crest (IZC) bone screws to retract the maxilla.

Option 3: Camouflage approach with extraction of all four second premolars to provide extra spaces. BS and IZC screws may be required.

Options 1 and 2 are more conservative without extraction, which is suitable for patients with dentophobia. However, expanding the mandibular arch for retraction of the mandible is challenging since the mandibular bone is denser and harder to expand. Option 3 is suitable for relieving anterior crowding, but there is the risk of torque loss on the anterior teeth, which may worsen the retroclination of the mandibular incisors for the current patient. Clear aligner and brackets were both viable for all three options. The patient rejected extraction and preferred clear aligners for better esthetics during the whole orthodontic treatment. Thus, Invisalign® therapy with option 1 protocol was chosen.

Treatment Progress

The 1st stage was designed to adapt the patient to aligners with no activation. All attachments were bonded in the 2nd stage, and the patient was instructed to use the aligner seater, Chewies. After seating the aligners, the patient should chew on the chewies for a minimum of 5 minutes each time, and the accumulated chewing time per day should be at least an hour for better aligner conformation to the dentition.

Sequential distalization, which moves one tooth at a time, was prescribed throughout the treatment for mandibular retraction, starting from the L7s. Once the L7s were moved 1/3 to 2/3 of the way, movement of the L6s were initiated, and so on. Arch expansion was indicated for both arches in order to provide extra spaces. IPR was prescribed before stages 18, 34, 41, 49, and 57 (Fig. 6).

In the 6th month of treatment (20th stage of aligners), BS screws (2x12-mm, OrthoBoneScrew®, iNewton, Inc., Hsinchu, Taiwan) were inserted for mandibular retraction, and 4.5 oz elastics (Kangaroo 3/16-in, 4.5 oz; Ormco) were hooked from L3 to the BS screw bilaterally (Fig. 7). In the 11th month of treatment (34th

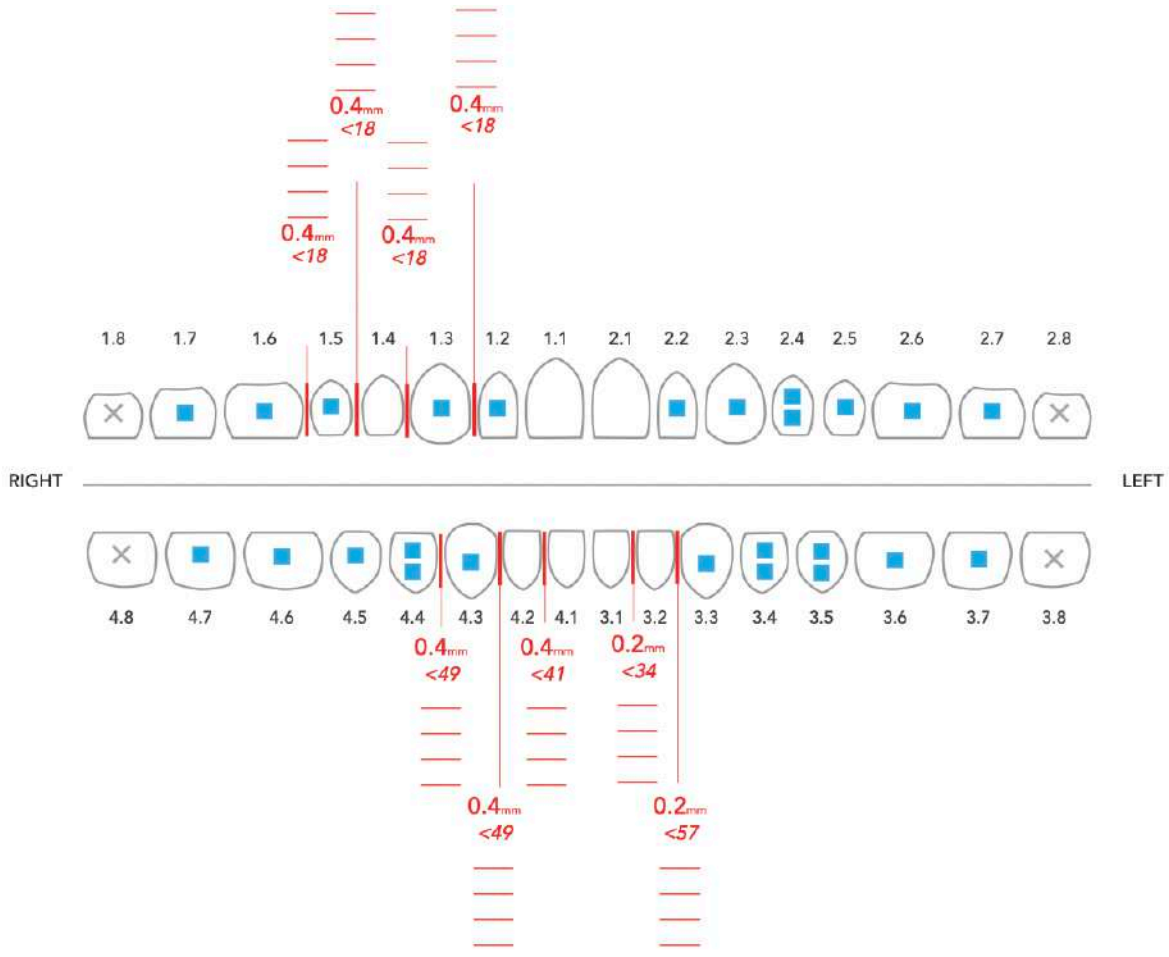


Fig. 6:
Clincheck® IPR and attachment designs. IPR was performed within the designated set of aligners to provide enough spaces for crowding relief and retraction.

stage), power ridges on L2s and L1s were added for better torque control. In the 12th month of treatment (35th stage), Class III elastics were introduced (Fox, 1/4-in, 3.5 oz; Ormco) from U6s to L3s (Fig. 7). Note the precision cuts instead of button cutouts were made on U6s in order to maximize aligner coverage on the teeth. At the end of this set of treatment, the molar relationship was nearly Class I.

After the first set of aligners (62 stages), the overjet was corrected from negative to a normal positive range. The overbite was also within normal range. Class I canine and molar relationships were achieved (Fig. 8). Note the positions of the molars in relation to the BS screws before and after mandibular retraction (Fig. 9). The BS screws were initially inserted on the buccal side between L6s and L7s. After the first set of

Fig. 7:
Intraoral photographs at 12 months of treatment. In the 6th month, BS screws were placed and elastics (Kangaroo 3/16-in, 4.5 oz; Ormco) were introduced bilaterally from L3s to the BS screws. In the 12th month, Class III elastics (Fox, 1/4-in, 3.5 oz; Ormco) were hooked bilaterally from the U6s to L3s.

Fig. 8:
62 stages of aligners were designed for the first set of treatment. Difference between predicted and achieved tooth movement (DPATM) after first set of aligners was slight thanks to good patient compliance. However, small finishing details were needed so there was one additional refinement.

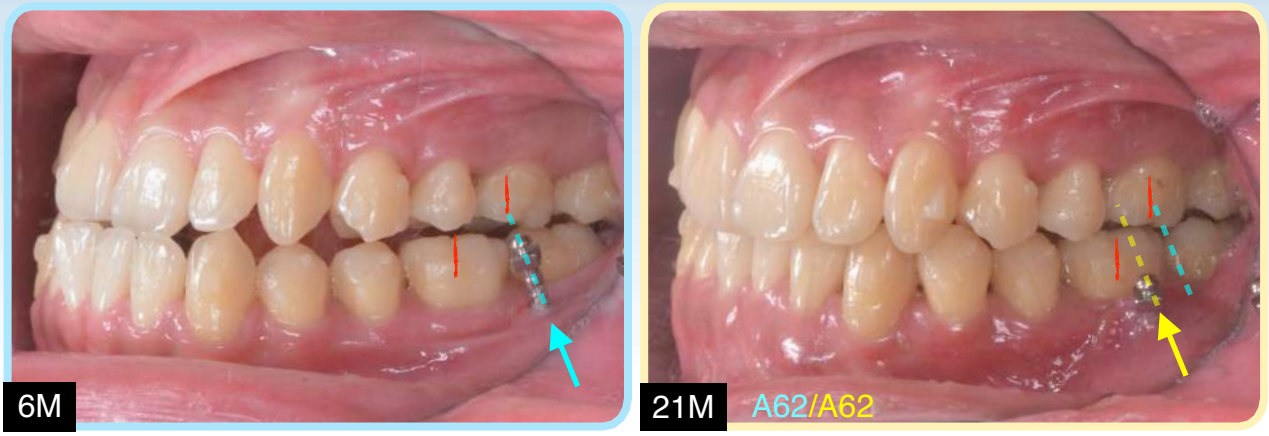


Fig. 9:
Note the relative position of the BS screw changed from between LL6 and LL7 (left; blue arrow, dotted line) to being in alignment with LL6 (right; yellow arrow, dotted line) on the buccal side, showing significant retraction of the mandibular arch.

treatment, they were positioned on the buccal side of L6s. Differences between predicted and achieved tooth movement (DPATM) were noticed at this stage (Fig. 8). Additional refinement stages were planned in order to improve partial teeth alignment (UR2 and LR1) and to expand the right side of the maxillary arch.

After the refinement, all treatment objectives were achieved. All appliances were removed, and retention was accomplished with maxillary and mandibular clear overlay retainers. Posttreatment records are shown in Figs. 10-13, and the full treatment progress is documented in Figs. 14-16.

Treatment Results

The facial profile was improved and more harmonious, with the lower lip retruded. Good dental alignment was achieved with bilateral Class I canine and molar relationships despite a minor discrepancy in the occlusal fitting of the posterior section. Anterior and posterior crossbites were both corrected, resulting in better occlusal function (Figs. 10-12). With daily oral functioning after treatment, the posterior intercuspation may be naturally improved after 6 to 12 months.

Superimposed cephalometric tracings (Fig. 13) showed that the flared maxillary incisors were corrected with good torque control. There was decreased mandibular incisor inclination (4°), which was inevitable after retracting the mandibular arch. However, the non-extraction protocol adopted for this patient successfully limited this side effect on the mandibular incisors. Furthermore, the L6s were retracted by BS screw traction and Class III elastics. The clockwise rotation of the mandible was due to the bite opening to correct the anterior crossbite. The ABO Cast-Radiograph Evaluation (CRE) score was 24 points (Worksheet 2), with major discrepancies in posterior occlusal contacts. The Pink and White esthetic score was 4 due to enlarged U1s tooth size (Worksheet 3).

Discussion

Conservative camouflage treatment for a Class III malocclusion is usually the preferred choice among

Fig. 10: *Posttreatment facial and intraoral photographs*

Fig. 11: *Posttreatment panoramic radiograph*

Fig. 12: *Posttreatment cephalometric radiograph*

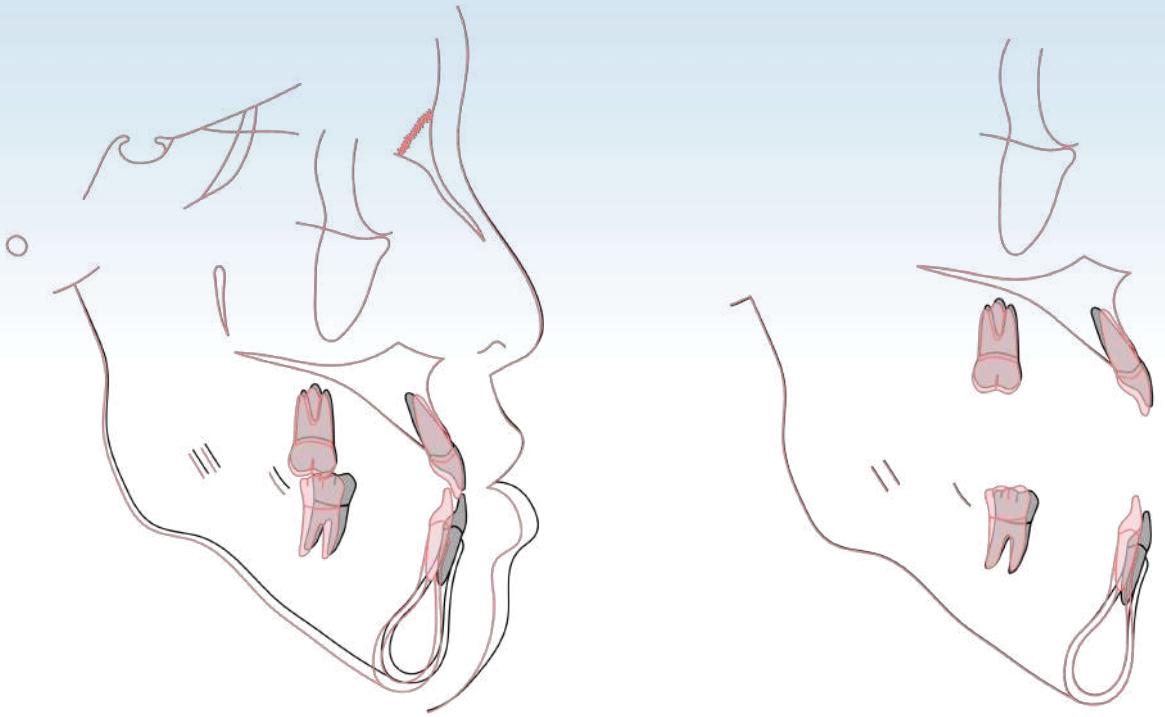


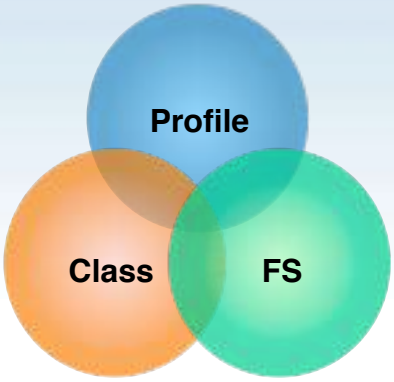
Fig. 13:
Superimposition of the cephalometric tracings before (black) and after (red) treatment documented good torque control of both maxillary and mandibular incisors, retraction of the mandibular arch, and clockwise rotation of the mandible.

Fig. 14:
Treatment progression is shown the right buccal view from the beginning (0M) to the end of treatment (28M). In the 6th month (6M), BS screws were placed with elastics (Kangaroo, 3/16-in, 4.5 oz; Ormco) hooked bilaterally to retract the mandibular arch. In the 13th month (13M), Class III elastics (Fox, 1/4-in, 3.5 oz; Ormco) were added.

Fig. 15:
Treatment progression is shown in the frontal view from the beginning (0M) to the end of treatment (28M). The first set of aligners finished in the 21st month. Refinement was carried out afterwards for additional adjustments. The overjet improved significantly throughout the treatment.

Fig. 16:
Treatment progression is shown in the left buccal view from the beginning (0M) to the end of treatment (28M). Note the relative position of BS screw from 6th month to 21st month in relation to the molars, which shows the retraction of the mandibular arch.

patients, but the treatment planning is challenging for orthodontists. The 3-Ring Diagnosis (Fig. 17) developed by John Lin is helpful for judging whether a case is suitable for camouflage treatment.[7] The three determining factors are evaluated under centric relation (C_R) position: 1. orthognathic profile, 2. buccal segments that are approximately Class I, and 3. functional shift to centric occlusion (C_O) (Fig. 17). The present case fitted none of these criteria; hence, conservative camouflage treatment was very challenging. However, as the patient preferred a non-surgical



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

Fig. 17:
Lin's Class III diagnostic system evaluates facial profile and molar classification in C_R, as well as the functional shift from C_R to C_O. If the profile is acceptable in C_R, molars are in or near Class I, and there is a significant functional shift, the patient usually can be effectively managed with Class III camouflage treatment.

and non-extraction treatment, Class III elastics, TSADs, and space creation were crucial.

Class III Elastics

Class III camouflage treatment with or without extraction usually involves intermaxillary Class III elastics with the whole maxillary dentition acting as anchorage to retract the mandibular dentition. According to Newton's third law of motion, the reaction force leads to protraction of the maxillary arch and labial tipping of the maxillary incisors.[8] Thus, resistant moments in the maxillary anterior segment are required via orthodontic devices.[9] An advantage of digital orthodontics is designing the torque control for individual teeth after evaluating the rotation of the whole arch. Alternatively, hooking the elastics on TSADs is another way to prevent the adverse effect of Class III elastics.

Placement of TSADs

Compared to intermaxillary Class III elastics, the osseous anchorage of TSADs to retract the mandible prevents the undesirable proclination of the maxillary incisors, which results in a more acute nasolabial angle.[10] For severe Class III patients, especially those with an open bite and proclined maxillary incisors, using Class III elastics as the main correcting mechanics is not recommended. Instead, BS screws are indicated.[11] One caution to be exercised is that if the slope of the buccal shelf is very steep, the BS screws are placed inter-radicularly. This limits the retraction effect for the whole lower arch due to the contact of the L6 distal root with the screw. However, BS screws are still very powerful in Class III treatments. Note the screw position in relation to the molars in this case (Fig. 9). The BS screw was initially inserted on the buccal side between LL6 and LL7; however, after 15 months, it was in alignment with LL6. The BS screws provided powerful anchorage to retract the mandibular arch. IZC screws are another option to avoid the undesirable proclination of maxillary incisors; they provide osseous anchorage for the Class III elastics.[12]

Providing Spaces for Arch Retraction

To relieve crowding or perform camouflage arch retraction, extra spaces in the arch are needed. Three common ways to provide extra spaces are: IPR, extraction, and arch expansion.[13]

In camouflage treatment, extraction is an effective method to produce dental compensation for the skeletal discrepancy.[14] Premolars and molars are usually the extraction options in Class III treatment.

Premolar extraction is a useful approach to relieve crowding in the anterior segment. However, the disadvantage is more distal tipping of lower incisors compared to extraction of posterior teeth.[15] Molar extraction is not useful for relieving anterior crowding, and closing extraction spaces is time-consuming, but it creates more space (10-11mm) for retraction compared to premolar extraction (7mm).[14]

Arch expansion is feasible with Invisalign® to resolve crowding and anteroposterior problems.[16,17] An 1mm increase in the inter-molar width will allow for approximately 0.6mm of space creation within the arch.[13] According to Ali et al.,[18] dental arch expansion should be limited to 2-3 mm per quadrant in order to minimize the risk of relapse and gingival recession. However, overcorrection of expansion in the maxillary posterior segment is suggested in order to achieve the desired expansion results. The accuracy of planned maxillary arch expansion with Invisalign® is 72.8%, while the accuracy for mandible was more precise, which is 87.7%.[19]

Conclusions

Skeletal Class III malocclusions often require extraction to provide space for mandibular distalization. However, when the patient refuses extraction, other methods of space creation such as IPR, arch expansion, and retraction can be adopted. When correcting anterior crossbite, buccal shelf screws and Class III elastics are viable choices to achieve a successful outcome.

References

1. Ishii H, Morita S, Takeuchi Y, Nakamura S. Treatment effect of combined maxillary protraction and chincap appliance in severe skeletal Class III cases. Am J Orthod Dentofacial Orthop 1987;92(4):304-312.
2. Graber TM, Vanarsdall RL, Vig KWL. Orthodontics. Current Principles and Techniques,4rth ed. St Louis: Mosby. 2005. p. 565.
3. Jaradat M. An overview of Class III malocclusion (prevalence, etiology and management). J Adv Med Med Res 2018;25(7):1–13.
4. Zheng M, Liu R, Ni Z, Yu Z. Efficiency, effectiveness and treatment stability of clear aligners: A systematic review and meta-analysis. Orthod Craniofac Res 2017;20(3):127–33.
5. Papadimitriou A, Mousoulea S, Gkantidis N, Kloukos D. Clinical effectiveness of Invisalign® orthodontic treatment: a systematic review. Prog Orthod 2018;19(1):1-24.
6. Cangialosi T, Riolo M, Owens S, Dykhouse V, Moffitt A, Grubb J et al. The ABO discrepancy index: a measure of case complexity. Am J Orthod Dentofac Orthoped 2004;125(3):270-8.
7. Lin JJ. Creative orthodontics blending the Damon System & TADs to manage difficult malocclusion. 3rd ed. Taipei, Taiwan: Yong Chieh; 2017. p. 259-276.
8. Ferreira FPC, Goulart M da S, de Almeida-Pedrin RR, Conti AC de CF, Cardoso M de A. Treatment of Class III malocclusion: atypical extraction protocol. Case Rep Dent 2017:ID 4652685.
9. Hu H, Chen J, Guo J, Li F, Liu Z, He S, Zou S. Distalization of the mandibular dentition of an adult with a skeletal Class III malocclusion. Am J Orthod Dentofacial Orthop 2012;142(6):854–62.
10. Huang S, Chang CH, Roberts WE. A severe skeletal Class III open bite malocclusion treated with nonsurgical approach. Int J Orthod Implantol 2011;24:28–39.
11. Lin JJ. Treatment of Severe ClassIII with buccal shelf mini-screws. News & Trends in Orthod 2010;18:3-12.

12. Lin JJ. The most effective and simplest ways of treating severe Class III, without extraction or surgery. Int J Orthod Implantol 2013;33:4-18.

13. O'higgins E, Lee R. How Much Space is Created from Expansion or Premolar Extraction?. Journal of Orthodontics 2000;27(1):11-13.

14. Cheng J, Chang CH, Roberts WE. Severe Class III open bite malocclusion: conservative correction with lower first molar extraction. J Digit Orthod 2021;61:50-66.

15. Akhoon AB, Mushtaq M, Ishaq A Borderline Class III patient and treatment options: A comprehensive review. Int J Med Heal Res 2018;4(2):14–6.

16. Womack WR, Ahn JH, Ammari Z, Castillo A. A new approach to correction of crowding. Am J Orthod Dentofacial Orthop 2002;122:310–316.

17. Giancotti A, Mampieri G. Unilateral canine crossbite correc- tion in adults using the Invisalign method: a case report. Orthodontics (Chic.) 2012;13:122–127.

18. Ali SA, Miethke HR. Invisalign, an innovative invisible orthodontic appliance to correct malocclusions: advantages and limitations. Dent Update 2012;39:254–256, 258–260.

19. Houle JP, Piedade L, Todescan R Jr., Pinheiro FH. The predictability of transverse changes with Invisalign. Angle Orthod 2017;87(1):19-24.

Discrepancy Index Worksheet

TOTAL D.I. SCORE: 32

OVREJET

0 mm. (edge-to-edge)	=	
1 - 3 mm.	=	0 pts.
3.1 - 5 mm.	=	2 pts.
5.1 - 7 mm.	=	3 pts.
7.1 - 9 mm.	=	4 pts.
> 9 mm. 9.5mm	=	5 pts.

Negative OJ (x-bite) 1 pt. per mm. Per tooth = 2mm

Total = 2

OVERBITE

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

Total = 0

ANTERIOR OPEN BITE

0 mm. (Edge-to-edge), 1 pt. per tooth
Then 1 pt. per additional full mm. Per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 0

CROWDING (only one arch)

1 - 3 mm.		=	1 pt.
3.1 - 5 mm.		=	2 pts.
5.1 - 7 mm.	6mm (upper)	=	4 pts.
> 7 mm.		=	7 pts.

Total = 1

OCCLUSION

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

Total = 8

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 4

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 1 x 1 pt. = 1

Each degree > 6° ____ x 1 pt. = ____

SN-MP

≥ 38° = 2 pts.

Each degree > 38° 5 x 2 pts. = 10

≤ 26° = 1 pt.

Each degree < 26° ____ x 1 pt. = ____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° ____ x 1 pt. = ____

ANB= -3°
SN-MP= 43°

Total = 17

OTHER (See Instructions)

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

Identify:

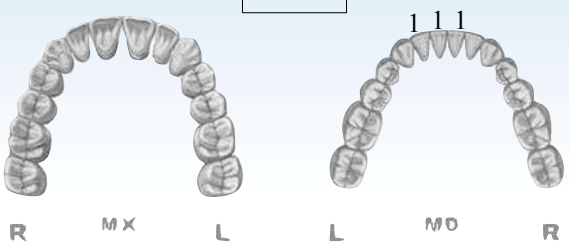
Total = 0

Cast-Radiograph Evaluation

Total Score: 24

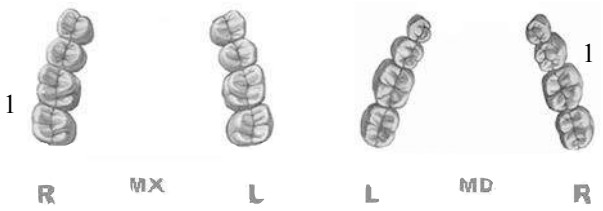
Alignment/Rotations

3



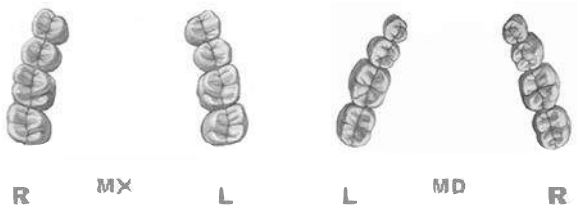
Marginal Ridges

2



Buccolingual Inclination

0

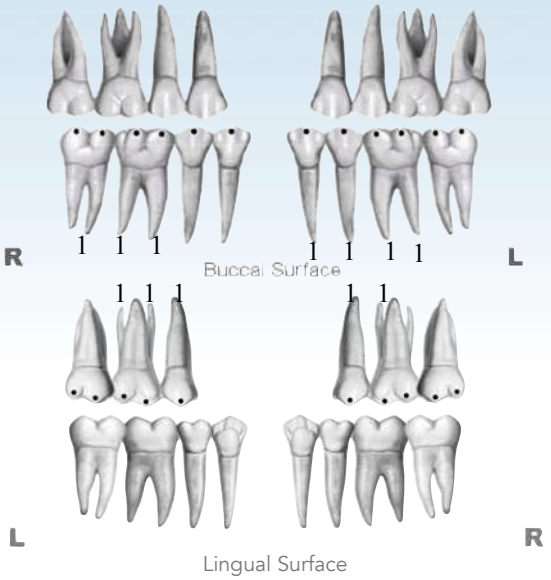


Overjet

0

Occlusal Contacts

12

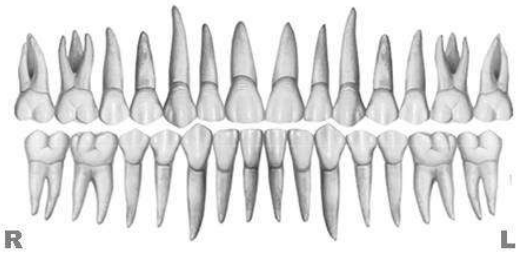


Occlusal Relationships

5

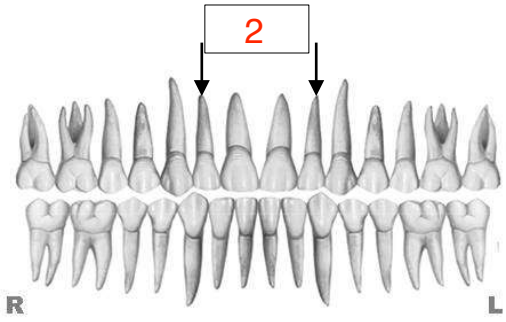
Interproximal Contacts

0



Root Angulation

2



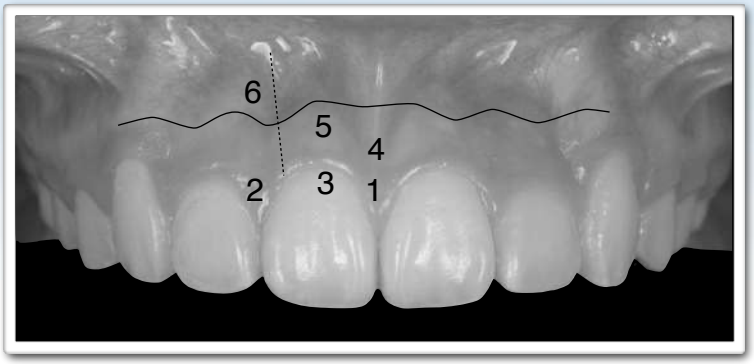
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score = 4

1. Pink Esthetic Score

Total = 0

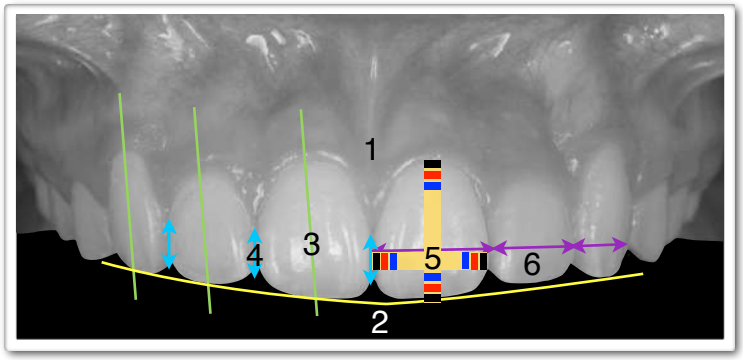


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 4



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

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

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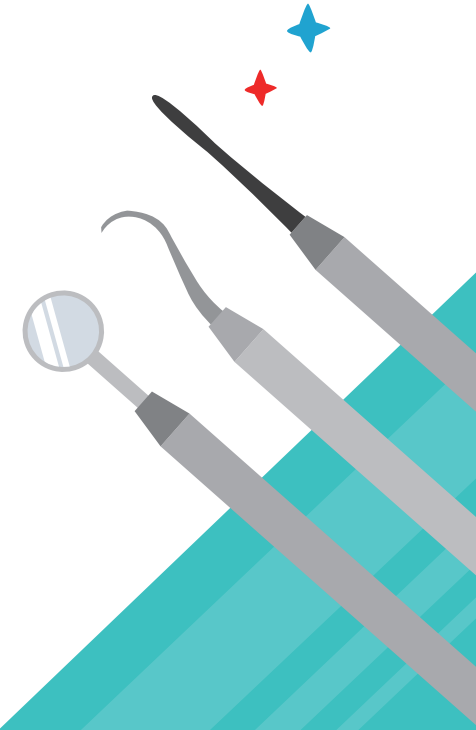

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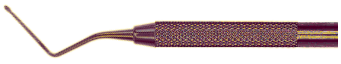

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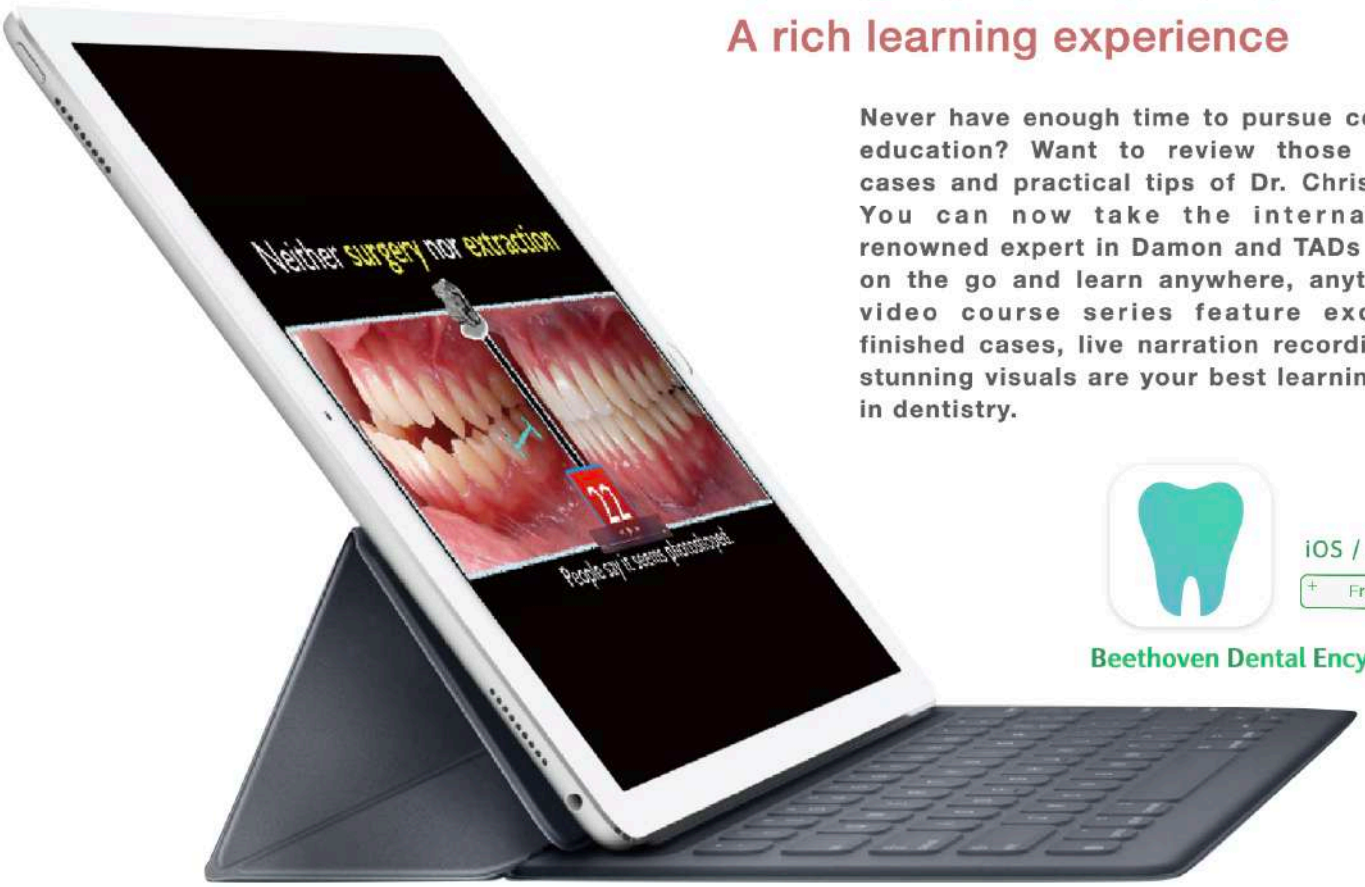

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此外，透過數位影片反覆觀看，結合矯正與電腦教學，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染**「熱愛學，熱愛學矯正」**的熱情。

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

Practice: Clinical photography

Module 2 - 4/28 (A班) | 7/14 (B班)

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

Practice: Patient photo management

Module 3 - 5/12 (A班) | 7/28 (B班)

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

Practice: Ceph tracing

Module 4 - 6/2 (A班) | 8/4 (B班)

1. Excellent finishing
2. Retention & relapse

Practice: Ceph superimposition & measurement

Module 5 - 6/16 (A班) | 9/1 (B班)

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

Practice: Case report demo

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

Module 6 - 7/21 (A班) | 9/22 (B班)

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment (曾淑萍醫師)

Module 7 - 8/18 (A班) | 10/20 (B班)

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

Topic: Modfied VISTA (蘇筌瑋醫師)

Module 8 - 9/15 (A班) | 11/3 (B班)

1. ABO DI, CRE workshop
2. Open bite

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

Module 9 - 9/29 (A班) | 12/1 (B班)

1. Implant-ortho combined treatment
2. Asymmetry

Topic: Interdisciplinary approach (邱上珍醫師)

Module 10 - 10/13 (A班) | 12/15 (B班)

1. Minor surgeries in orthodontics
2. Digital orthodontics

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

Module 11 - 11/10 (A班) | 12/22 (B班)

1. Aligner & TADs
2. Keys to aligner learning

Topic: Pre-aligner treatment (林詩詠醫師)

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報名專線 湧傑 Yong Chieh

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Lower First Molar Extraction to Treat a Class III Malocclusion with Three-Dimensional Problems

Abstract

Introduction: *A 24-year-old female presented with chief complaints of protruded chin, protrusive lower lip, and poor smile esthetics.*

Diagnosis: *Cephalometric analysis showed a skeletal Class III relationship (SNA, 81°; SNB, 84°; ANB, -3°) with high mandibular plane angle (SN-MP, 50°). An intraoral assessment revealed bilateral Class III malocclusion with anterior crossbite (UR1, UR2, UR3, UL1, UL2, and UL3), and the lower midline was deviated 1.5mm to the right. Mild crowding was present in the lower anterior dentition. The Discrepancy Index (DI) was 61.*

Treatment: *A Damon® system appliance with passive self-ligating brackets was applied to correct the dental malocclusion after extracting four molars (UR8, UL8, LR6, and LL6). Posterior bite turbos and early light short Class III elastics were used to correct the anterior crossbite. Space closing and midline correction were also accomplished with elastics. The active treatment time was 29 months. The dentition was aligned, and space was created for an implant-supported prosthesis (ISP) to restore UL6.*

Results: *Retraction of the lower anterior segment and adjacent lip was achieved to improve the profile. After 29 months of active treatment, this severe skeletal malocclusion was corrected to an excellent Cast-Radiograph Evaluation (CRE) of 23 points and a Pink and White esthetic score of 9. No root resorption nor periodontal problems were noted.*

Conclusions: *This case report demonstrates the use of passive self-ligating appliances to resolve skeletal and dental Class III malocclusions without orthognathic surgery. (J Digital Orthod 2022;67:50-66)*

Key words:
Skeletal Class III, full-cusp Class III, non-surgical treatment, anterior crossbite, torque selection, bite turbos

The dental nomenclature for this report is a modified Palmer notation with four oral quadrants: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). From the midline, permanent teeth are numbered 1-8, e.g., a lower right first molar is LR6.

Introduction

Class III malocclusions are challenging particularly when combined with vertical problems, e.g., deep bite. For mature adults, using camouflage treatment as an alternative to orthognathic surgery has long been debated.[1] Orthognathic surgery certainly has specific advantages when the patient needs a skeletal correction; however, the expense and surgical morbidity are unattractive aspects. This is the main reason that camouflage treatment was developed - to achieve a compromised but acceptable outcome.[2] Camouflage treatments, with or without extractions, are usually accomplished with intermaxillary Class III elastics, with the whole maxillary dentition as anchorage to retract the mandibular arch.[3] Class III camouflage treatment with extractions can improve the ANB angle and decrease facial convexity with little or no change in the vertical dimension of the occlusion (facial

Daisy T. Lin,
Training Resident, Beethoven Orthodontic Center (Left)
Lexie Y. Lin,
Resident, Beethoven Orthodontic Center (Center left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center right)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

height).[4-9] With careful selection and diagnosis, 92% of adult patients with Class III malocclusion can be effectively treated with orthodontic therapy alone.[1] This case report documents the conservative management of an adult skeletal Class III malocclusion complicated with anterior crossbite, posterior crossbite, and deep bite

Fig. 1: *Pre-treatment facial and intraoral photographs in centric occlusion (C_o)*

Fig. 2: *Pre-treatment cephalometric radiographs are compared in centric occlusion (C_O) and centric relation (C_R). In the C_R position, the incisors are in an end-to-end relationship, and the facial profile is acceptable.*

(Fig. 1). Conservative camouflage treatment was the patient's preference.

Diagnosis and Etiology

A 24yr-11mo-old female presented for orthodontic consultation with the following chief concerns: protruded chin, protrusive lower lip, and poor smile esthetics (Fig. 1). No contributing medical or dental history was reported. The facial profile was less convex than normal (Fig. 2). An intraoral examination revealed an anterior crossbite from UR3 to UL3 and posterior crossbite from UR5 to UR7 (Fig. 3; Table 1). The overjet was -3mm, and the overbite was 6mm. Mild crowding (1mm) was found in the mandibular arch, and a ~3mm diastema was present in the maxillary arch. The molar relationship was full-cusp Class III on both sides (Fig. 1). The lower midline was shifted 1.5mm to the right.

There were no signs nor symptoms of temporomandibular disorder (TMD). The panoramic

Fig. 3: *Three-dimensional problems included transverse posterior crossbite (left), sagittal anterior crossbite (center), and vertical deep bite (right).*

radiograph showed the UL6 was missing (Fig. 4). The pre-treatment cephalometric radiographs and intraoral examination revealed: (1) an orthognathic profile in C_R position, (2) 3mm anterior functional shift, and (3) near Class I buccal relationships in C_R (Fig. 2). The cephalometric analysis (Table 1) documented an ANB angle of -3˚ and protruded lower lip (3.5mm to the E-Line). A careful evaluation of the Discrepancy Index (DI = 61)[10] (Worksheet 1) and Lin's 3-Ring Diagnosis (Fig. 5) indicated conservative treatment was feasible. However, according to Chang's Extraction Decision Chart (Table 2), extractions were needed to manage the high mandible angle, flared anterior inclination, and the ill-fitted prostheses on LL6 and LR6.

Treatment Objectives

1. Correct the anterior and posterior crossbite.
2. Maintain the straight profile in C_R position.
3. Achieve Class I canine and molar relationships.
4. Create ideal overjet (OJ) and overbite (OB).

Fig. 4: *Pre-treatment panoramic radiograph*

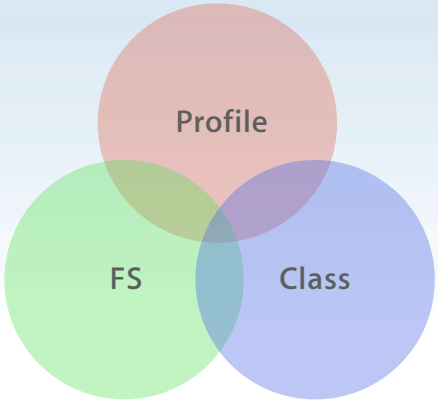
Treatment Plan

The plan for this camouflage treatment was to resolve the Class III relationship by retracting the lower arch and correcting the anterior and posterior crossbite. Extraction of the UR8, UL8, LR6, and LL6 was scheduled to relieve the crowding and retract the lower lip. Create space between UL5 and UL7 in order to restore the UL6 with an implant-supported prosthesis (ISP). Use posterior bite turbos and elastics to assist with the correction, and rectify molar relationship using Class III elastics. Low-torque and standard brackets were selected for the upper

CEPHALOMETRIC SUMMARY

SKELETAL ANALYSIS	PRE-TX	POST-TX	DIFF.
SNA˚ (82˚$_{\pm 4}$)	81˚	82˚	1˚
SNB˚ (80˚$_{\pm 4}$)	84˚	82˚	2˚
ANB˚ (2˚$_{\pm 4}$)	-3˚	0˚	3˚
SN-MP˚ (32˚$_{\pm 6}$)	50˚	51˚	1˚
FMA˚ (25˚$_{\pm 6}$)	43˚	44˚	1˚
DENTAL ANALYSIS			
U1 TO NA mm (4mm$_{\pm 3}$)	9	7	2
U1 TO SN˚ (104˚$_{\pm 4}$)	111˚	107˚	4˚
L1 TO NB mm (4mm$_{\pm 3}$)	10	5	5
L1 TO MP˚ (90˚$_{\pm 4}$)	78˚	60˚	18˚
FACIAL ANALYSIS			
E-LINE UL (-1mm$_{\pm 2}$)	1	0	1
E-LINE LL (0mm$_{\pm 2}$)	3.5	-1	4.5
%FH: Na-ANS-Gn (53%$_{\pm 3}$)	57%	51%	6%
Convexity:G-Sn-Pg' (13˚)	3˚	5˚	2˚

Table 1: *Cephalometric summary*



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

Fig. 5: The Class III diagnostic system of John Lin

	Ext	Non
Profile	Protrusive	**Straight**
Md. angle	**High**	Low
Bite	Open	**Deep**
Ant. inclination	**Flaring**	Flat
Crowding	> 7 mm	**None**
Decay/ missing	**Present**	?
P't perception	**OK**	No
Etc…		

Table 2: Chang's Extraction Decision Table

anterior teeth, and high-torque for the lower anterior teeth, respectively, to compensate for the side effects of Class III elastic mechanics.

Treatment Alternatives

LeFort I orthognathic surgery with bilateral sagittal split osteotomy (BSSO) was the surgical treatment option for the patient. However, the patient was concerned about the risk of surgical complications so she preferred non-surgical options.

Treatment Progress

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

Before active orthodontic treatment, the patient was referred to extract the UR8, UL8, LR6, and LL6. Two weeks later, Damon Q® 0.022-in PSL brackets (Ormco, Glendora, CA) were bonded on the lower teeth with a 0.014-in CuNiTi archwire engaged. Upside-down low-torque brackets were bonded on the lower anterior teeth to serve as high-torque brackets (Fig. 6) to help avoid torque loss during the retraction of the lower arch.

After one month of aligning and leveling the lower arch, the upper dentition was also bonded with PSL brackets. Standard torque brackets were used on all upper teeth except for the maxillary lateral incisors, which were bonded with low-torque brackets to counteract the side effects of Class III mechanics. At the same appointment, two occlusal bite turbos were constructed with Fuji II® type II glass ionomer cement (GC America, Alsip IL) on the UR7 and UL7 to open the intermaxillary space for correction of the anterior crossbite (Fig. 7).

Fig. 6:
Low-torque brackets were bonded upside down to express high-torque in the lower anterior teeth.

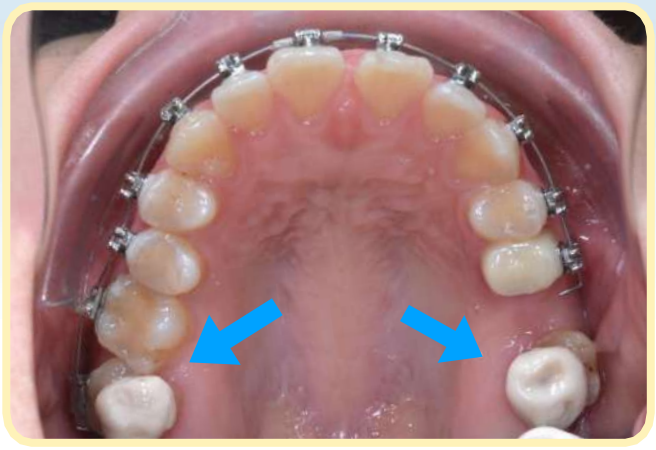


Fig. 7:
Posterior bite turbos (blue arrows) were bonded on the maxillary arch to open the bite.

Early light short Class III elastics (Quail 3/16-in 2 oz, Ormco) were used for 3 months to correct the anterior crossbite. In the 4th month of treatment, a positive overjet was achieved, and thus the bite turbos were removed.

In the 8th month, leveling and alignment was completed. Both archwires were changed to 0.017x0.025-in TMA. Class III elastics (Fox, 1/4-in, 3.5-oz; Ormco) were used bilaterally for four months to achieve canine Class I occlusion (Fig. 8).

In the 12th month, lingual buttons were placed on the lingual surfaces of LL5, LL8, LR5, and LR8. Power chains were hooked between the buttons in order to prevent molar rotation during the closure of extraction spaces (Fig. 9). At the same time, an open coil spring was used to create space at the UL6 extraction site. In the 19th month, an implant-supported prothesis (ISP) was installed to restore the UL6 (Fig. 10). A crestal incision was performed lingual to the center of the edentulous ridge, and a full thickness mucoperiosteal flap was reflected. After that, a surgical guide pin was placed to check with a

Fig. 8:
Five-ring power chains were applied bilaterally to close extraction spaces, and Class III elastics were used to adjust canine and molar relationships.

periapical X-ray film, which showed the mesiodistal angulation with no penetration into the sinus. An implant fixture (4.3x10-mm OsseoSpeed™TX, Densply International, York, PA) was installed according to the manufacturer's instructions, and a healing abutment (ø5.0xH5.0-mm) was placed. The soft tissue flap was repositioned and closed with interrupted 4-0 sutures.

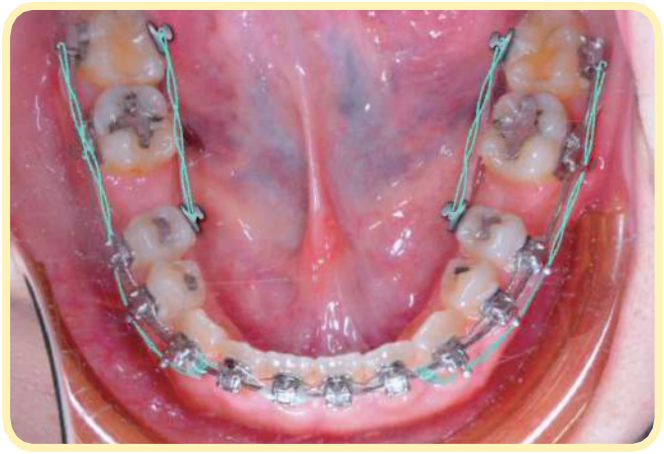


Fig. 9: *Buccal-lingual mechanics was facilitated to close the extraction space in the mandibular arch after 12 months of treatment.*

In the 22nd month, the mandibular extraction spaces were closed. After 29 months of active treatment, all fixed appliances were removed. A direct impression was made after 3 months, and new clear retainers were prepared after the delivery of the UL6 prosthesis. Posttreatment records are documented in Figs. 11-14.

Results Achieved

Facial esthetics and Class III malocclusion were significantly improved after 29 months of active treatment (Fig. 11). The canine relationships were corrected to Class I, and the molar relationship was significantly improved. The posttreatment panoramic radiograph documented acceptable root parallelism except for LR6 (Fig. 13). The superimposed cephalometric tracings showed the protracted LR7

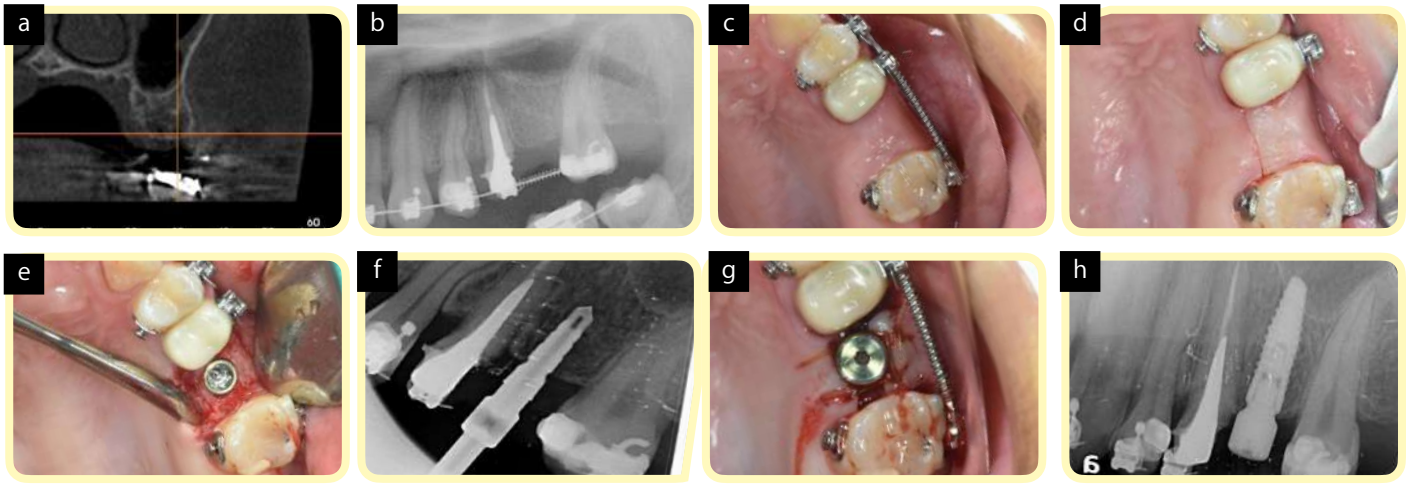


Fig. 10: *Steps involved in the placement of the implant are illustrated as follows: (a)&(b) Pre-operative radiographic examination for implant site. (c) UL6 extraction site was prepared as implant space. (d) Incisions were performed lingual to the mid-crestal and sulcular for flap reflection. (e) Occlusal view of implant fixture. (f) A guide pin was placed to check the axial direction and depth. (g) The healing abutment was placed. (h) Post-operative periapical X-ray shows good parallelism.*

Fig. 11: *Posttreatment facial and intraoral photographs*

(6mm) as a result of closing the extraction spaces with elastic force (Fig. 12). The axial inclination of the upper incisor (U1-SN) decreased 4˚ after treatment (111˚ to 107˚), and the axial inclination of the lower incisors (L1-MP) was inevitably tipped lingually (78˚ to 60˚). The upper and lower lips were both retruded following the retraction of the anterior segments. The mandibular plane angle (SN-MP) was well-maintained (Table 1). The Cast-Radiograph Evaluation (CRE) score was 23 points, as shown in the supplementary Worksheet 2.[11] The Pink and White dental esthetic score was 9 points (Worksheet 3).[12] The patient was pleased with the final result.

Retention

To prevent relapse of crowding, a fixed retainer was placed on the lingual surfaces from UR2 to UL2 of the maxillary arch. Two ESSIX® overlay retainers (Dentsply Sirona, Harrisburg, PA) were provided to retain the

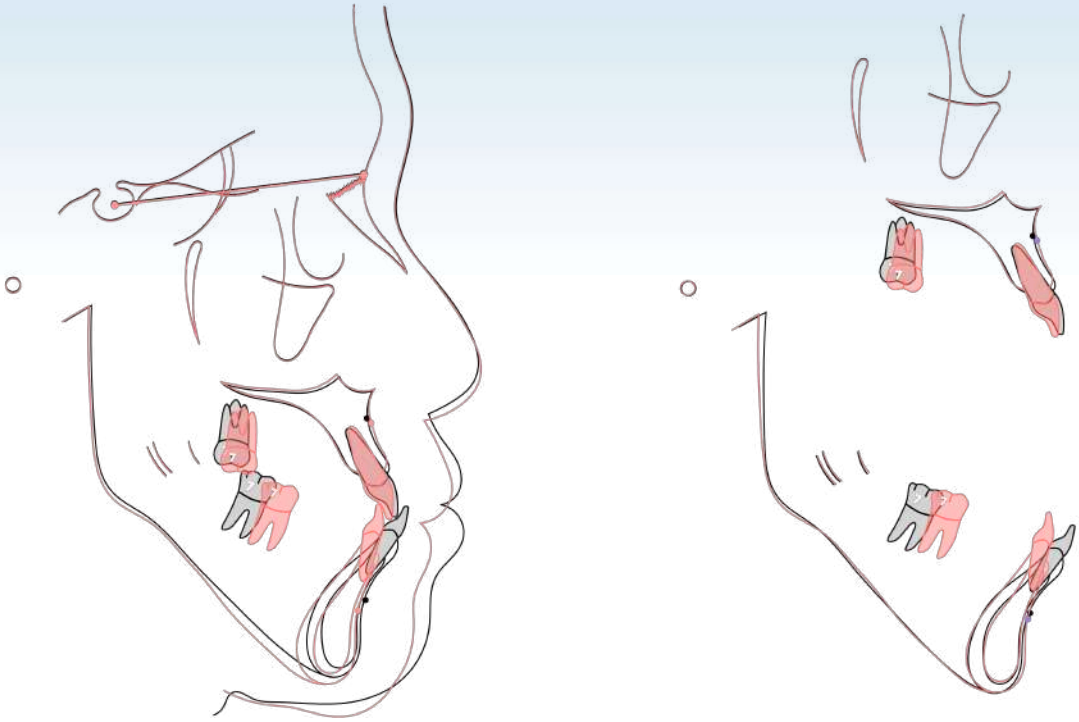


Fig. 12:
Superimposed cephalometric tracings (black: pre-treatment; red: posttreatment) show that the pre-treatment Class III molar relationship was corrected to Class I due to 6mm protraction of the L7s, which was a benefit from the L6 extractions. However, inevitable lingual tipping of the lower incisors occurred due to the Class III mechanics.

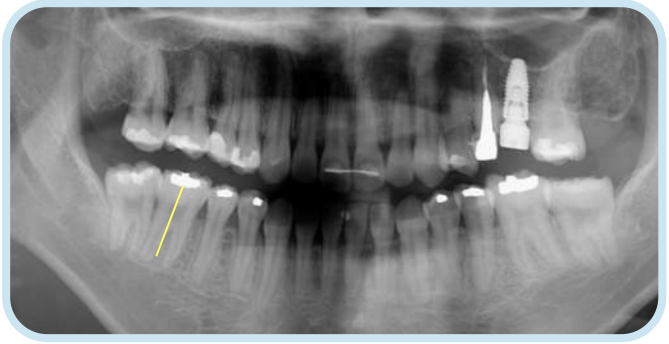


Fig. 13:
Posttreatment panoramic radiograph. Note root parallelism of LR6 was compromised.

Fig. 14: *Posttreatment cephalometric radiograph*

leveling and alignment of the dentition. The patient was instructed to use the overlay retainers full time for the first month and only while sleeping thereafter.

Discussion

The American Association of Oral and Maxillofacial Surgeons recommends orthognathic surgery if the horizontal overjet is zero or negative and the A-P molar discrepancy is ≥4mm Class III. However, a substantial functional shift may accentuate a dental discrepancy such as anterior crossbite.[12] A non-surgical treatment may be feasible by correcting the shift and increasing the lower facial height. Although Class III camouflage treatment is often challenging for orthodontists, an accurate diagnosis and appropriate treatment plan usually results in favorable non-surgical outcomes.

A Class III malocclusion like the current case puts practitioners at the intersection between a surgical and a non-surgical solution. This is when the 3-Ring Diagnosis developed by John Lin is particularly helpful for treatment planning (Fig. 5).[13,14]

For this patient, the mandible was fully grown before treatment. Therefore, the orthognathic facial profile in centric relation (C_R) position implied a good prognosis with camouflage treatment. It was carried out with a satisfactory result in only 29 months without orthognathic surgery (Figs. 11-14). Treatment progress is documented in Figs. 15-18. The major problems in this case were: (1) the full-cusp Class III malocclusion, (2) anterior crossbite and deep bite (6mm), as well as (3) missing UL6.

Full-Cusp Class III Malocclusion

In order to correct the anterior crossbite and improve the posterior intercuspation, Chang's Extraction Decision Table (Table 2) was used to assess the necessity for extractions. The factors favoring extractions were the high mandibular plane and anterior incisal inclination. In Class III camouflage treatments, U5 and L4 extractions are a common solution. For this case, LL6 and LR6 had compromised restorations so they were extracted instead of L5s. Furthermore, extraction of UR8 and UL8 was indicated because of their unusually small size. The patient was open to extractions so UR6, UR8, and UL8 were removed to provide space to correct the severe skeletal malocclusion (DI = 61).

Anterior Crossbite and Deep Bite Correction

For the anterior crossbite correction, bite turbos were placed on the occlusal surfaces of the maxillary molars to open the bite (Fig. 7).[15] Once sufficient intermaxillary space was created, a Ni-Ti archwire was placed into the brackets to align and level the dentition without the risk of occlusal interference. Bite turbos (glass ionomer cement occlusal bite raisers) were bonded on the posteriors rather than anteriors due to the big negative overjet.

The protocol for bite turbos was necessary to correct the anterior crossbite[16] because they: (1) prevent premature occlusal contact on brackets, (2) control wear on the teeth particularly with parafunction, (3) facilitate arch development, and (4) create interocclusal space for the crossbite correction.

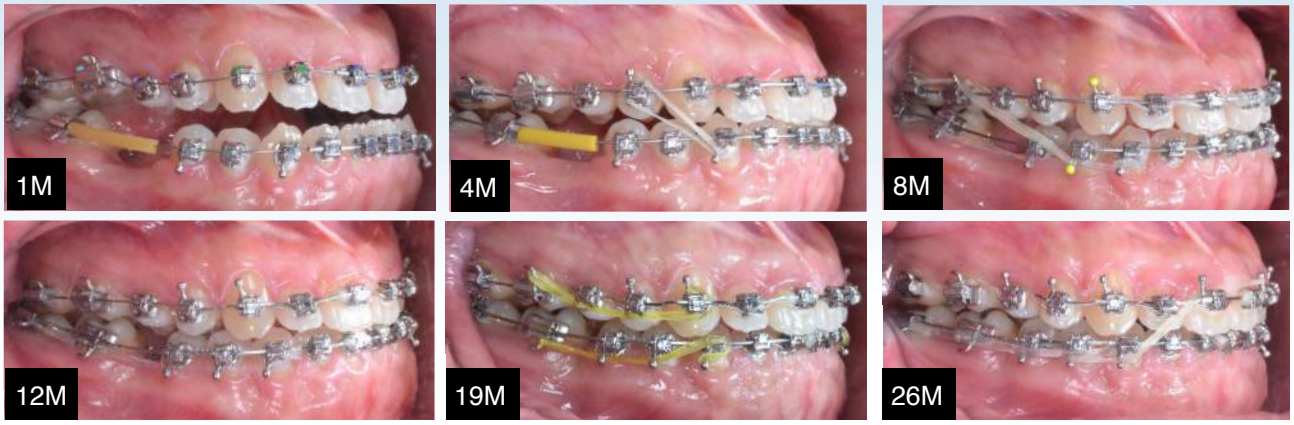


Fig. 15:
Treatment progression from the right buccal view. Z-type elastics were used to correct the midline deficiency as shown at 26 months (26M).

Fig. 16:
Treatment progression from the frontal view. High torque brackets for the lower arch and low or standard torque brackets for the upper incisors were chosen to compensate for the reaction of Class III elastics mechanics.

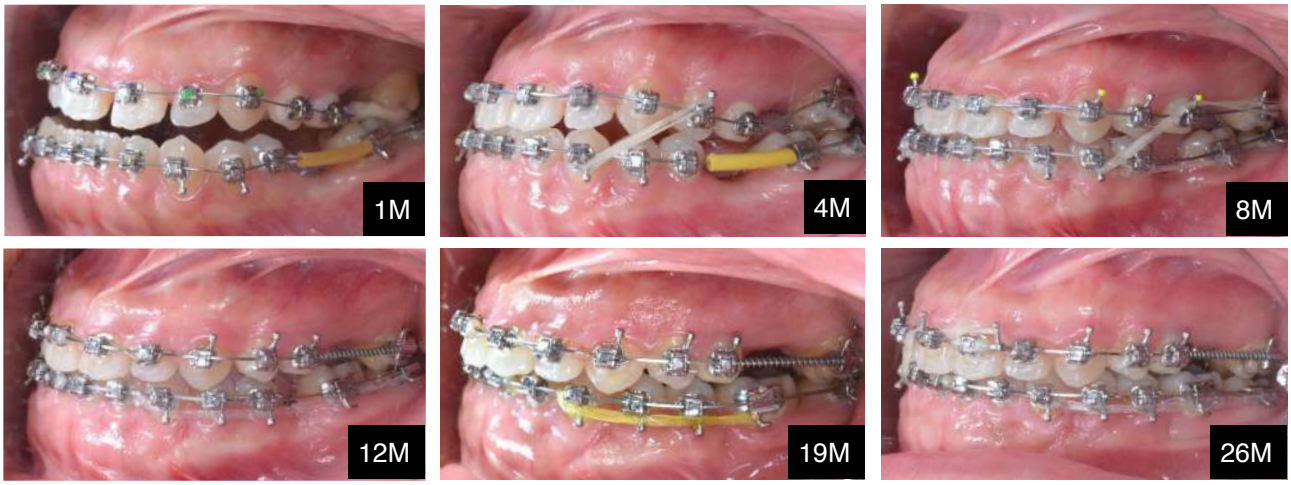


Fig. 17: Treatment progression from the left buccal view. From the 12th month, an open coil spring was used to increase space for UL6 ISP placement.

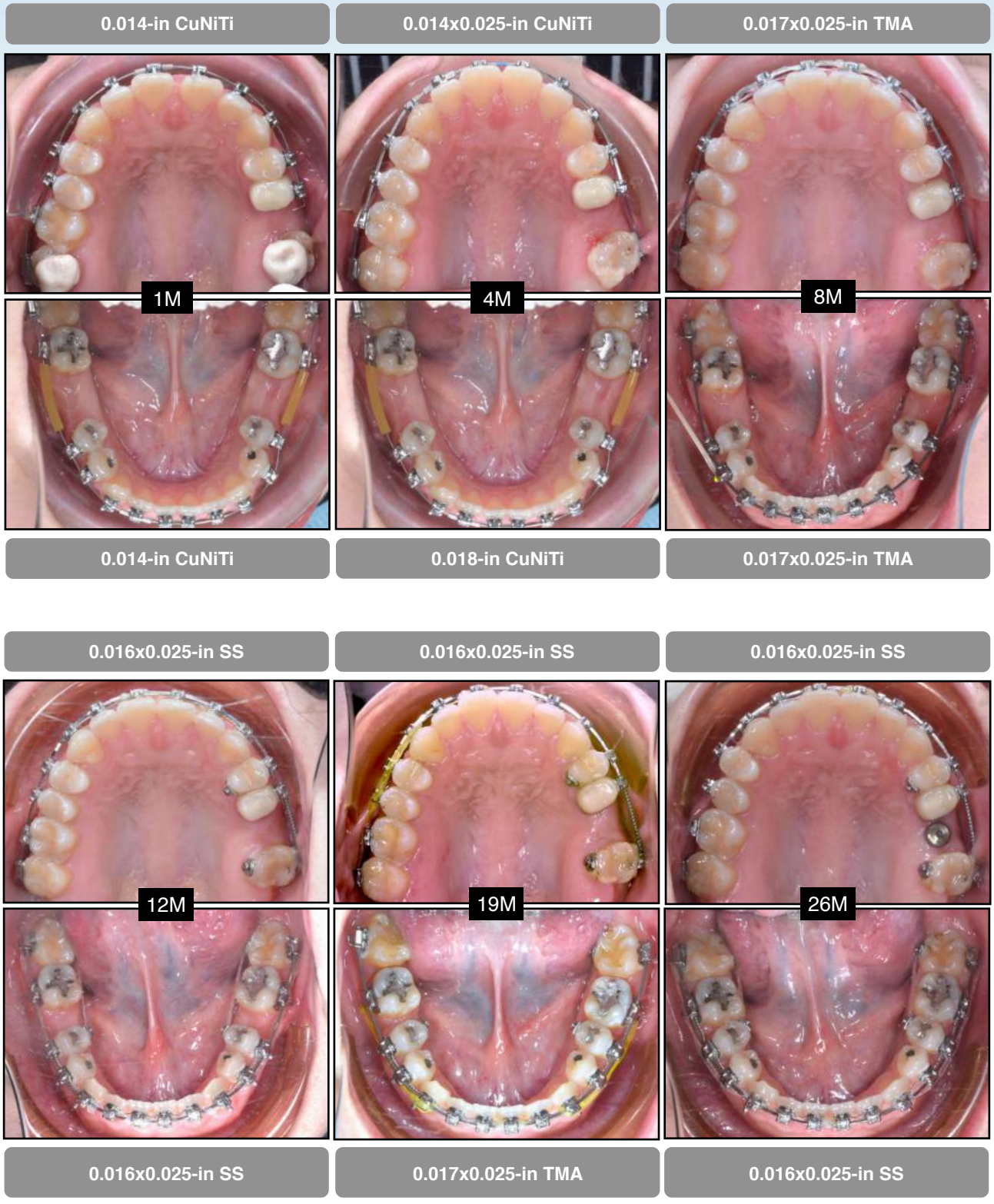


Fig. 18: *Treatment progression from the upper and lower occlusal views*

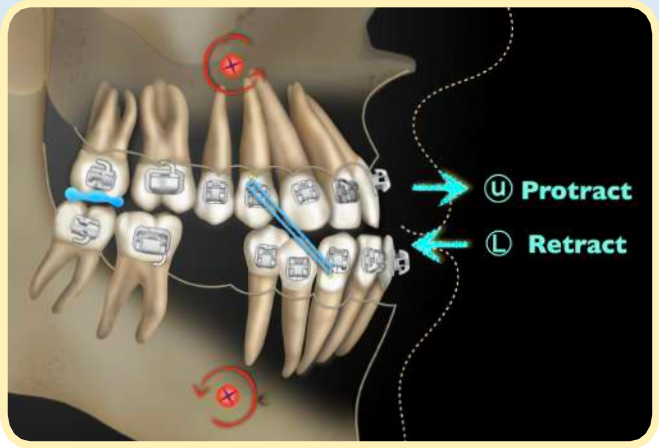


Fig. 19: *Class III elastic mechanics*
a counterclockwise rotation appears in the lower arch when using Class III elastics. The bracket selection should be high-torque (HQ) for the lower anterior and low-torque (LQ) for the upper anterior segments to counteract the force.

Bite turbos can be placed in the anterior or posterior segments of either arch; however, there are some limitations: it is best to avoid (1) weak teeth, such as upper lateral incisors, (2) endodontically treated, periodontally compromised dentition, (3) teeth with large restorations or temporary crowns, (4) isolated teeth subject to high stress, and (5) target teeth that are to be moved. When the occlusion is disoccluded, make sure the bite opening is bilateral and comfortable for the patient. For the present case, it was necessary to level and align multiple teeth, so the bite turbos were placed on the second molars. Opening the bite accelerated the initial stage of the orthodontic treatment. In this case, only three months were required to correct the anterior crossbite with the posterior bite turbos and Class III elastics.

In general, Class III elastics protract the upper arch, retract the lower arch, tip the upper incisors labially, and tip the lower incisors lingually (Fig. 19).[17] To counteract the adverse effects of Class III elastics, resistant anterior moments in the braces and archwires are required.[3] Therefore, high-torque brackets (low-torque brackets placed upside down) were chosen for the lower anterior teeth to prevent decreased axial inclination. On the other hand, low-torque or standard-torque brackets were selected for the upper anterior segment.

Buccal-Lingual Mechanics

In camouflage treatments, extraction of molars instead of premolars provides more space, which can be used to produce dental compensation for the jaw discrepancy. Another benefit is decreasing the retroclination of the lower anterior teeth. However, the molar extraction approach is expected to increase the treatment time by 6-8 months.[18] The method of buccal-lingual mechanics is effective in closing the remaining extraction spaces. The mechanics were performed with power chains, which were hooked not only between the brackets on the buccal side but also between the lingual buttons (Fig. 9). There are three benefits of this method: (1) it prevents molar rotations during closure of the extraction spaces; (2) continuous light force of the power chains helps avoid root resorption; and (3) its operation is simple, reducing chair time for the patient.

Conclusions

This difficult skeletal malocclusion was treated to an acceptable result without orthognathic surgery in only 29 months. With Chang's Extraction Decision Table (Table 2), a feasible treatment plan was completed with an esthetic outcome. In retrospect,

the key to success was using posterior bite turbos together with Class III elastics. A major compromise was the 60° L1-to-MP angle. Therefore, long-term follow-up is indicated to assure the continuous stability and maintenance of the occlusion.

References

1. Stellzig-Eisenhauer A, Lux CJ, Schuster G. Treatment decision in adult patients with Class III malocclusion: orthodontic therapy or orthognathic surgery? Am J Orthod Dentofacial Orthop 2002;122(1):27-37.

2. Proffit WR, Fields Jr HW, Sarver DM. Contemporary orthodontics. Elsevier Health Sciences; 2006.

3. Hu H, Chen J, Guo J, Li F, Liu Z, He S et al. Distalization of the mandibular dentition of an adult with a skeletal Class III malocclusion. Am J Orthod Dentofacial Orthop 2012;142(6):854-862.

4. Chang HF, Chen KC, Nanda R. Two-stage treatment of a severe skeletal Class III, deep bite malocclusion. Am J Orthod Dentofacial Orthop 1997;111(5):481-486.

5. Lin J, Gu Y. Preliminary investigation of nonsurgical treatment of severe skeletal Class III malocclusion in the permanent dentition. Angle Orthod 2003;73(4):401-410.

6. Costa Pinho TM, Ustrell Torrent JM, Correia Pinto JG. Orthodontic camouflage in the case of a skeletal class III malocclusion. World J Orthod 2004;5(3).

7. Rabie A-BM, Wong RW, Min G. Treatment in borderline Class III malocclusion: orthodontic camouflage (extraction) versus orthognathic surgery. Open Dent J 2008;2:38-48.

8. Troy BA, Shanker S, Fields HW, Vig K, Johnston W. Comparison of incisor inclination in patients with Class III malocclusion treated with orthognathic surgery or orthodontic camouflage. Am J Orthod Dentofacial Orthop 2009;135(2):146. e141-146. e149.

9. Burns NR, Musich DR, Martin C, Razmus T, Gunel E, Ngan P. Class III camouflage treatment: what are the limits? Am J Orthod Dentofacial Orthop 2010;137(1):9. e1-9. e13.

10. Cangialosi TJ, Riolo ML, Owens Jr SE, Dykhouse VJ, Moffitt AH, Grubb JE et al. The ABO discrepancy index: a measure of case complexity. Am J Orthod Dentofacial Orthop 2004;125(3):270-278.

11. Casko JS, Vaden JL, Kokich VG, Damone J, James RD, Cangialosi TJ et al. Objective grading system for dental casts and panoramic radiographs. Am J Orthod Dentofacial Orthop 1998;114(5):589-599.

12. Gazit-Rappaport T, Weinreb M, Gazit E. Quantitative evaluation of lip symmetry in functional asymmetry. Eur J Orthod 2003;25(5):443-450.

13. Kerr W, Ten Have T. Changes in soft tissue profile during the treatment of Class III malocclusion. Br J Orthod 1987;14(4):243-249.

14. Lin JJ-J. Creative orthodontics: blending the Damon System & TADs to manage difficult malocclusions. Taipei, Taiwan: Yong Chieh; 2007.

15. Tzatzakis V, Gidarakou IK. A new clinical approach for the treatment of anterior crossbites. World J Orthod 2008;9(4):355-365.

16. Tseng LLY, Chang CH, Roberts WE. Diagnosis and conservative treatment of skeletal Class III malocclusion with anterior crossbite and asymmetric maxillary crowding. Am J Orthodo Dentofacial Orthop 2016;149(4):555-566.

17. Ferreira FPC, Goulart MdS, de Almeida-Pedrin RR, Conti ACdCF, Cardoso MdA. Treatment of Class III malocclusion: atypical extraction protocol. Case Rep Dent 2017:doi.org/10.1155/2017/4652685

18. de Oliveira Ruellas AC, Baratieri C, Roma MB, de Moraes Izquierdo A, Boaventura L, Rodrigues CS et al. Angle Class III malocclusion treated with mandibular first molar extractions. Am J Orthod Dentofacial Orthop 2012;142(3):384-392.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 61

OVREJET

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

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

Total = 12

OVERBITE

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

Total = 3

ANTERIOR OPEN BITE

0 mm. (Edge-to-edge), 1 pt. per tooth
Then 1 pt. per additional full mm. Per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 0

CROWDING (only one arch)

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

Total = 1

OCCLUSION

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

Total = 8

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 3

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° 1 x 1 pt. = 1

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

SN-MP

≥ 38° = 2 pts.

Each degree > 38° 12 x 2 pts. = 24

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = 31

OTHER (See Instructions)

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

Identify:

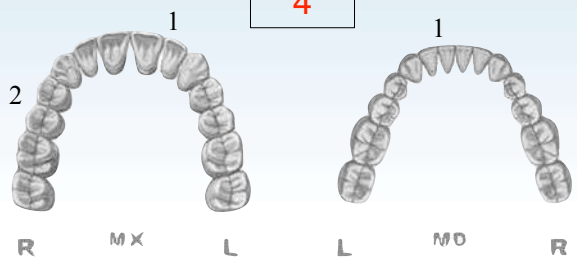
Total = 3

Cast-Radiograph Evaluation

Total Score: 23

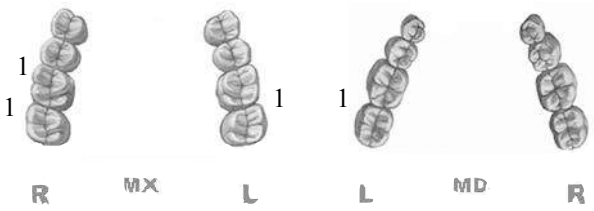
Alignment/Rotations

4



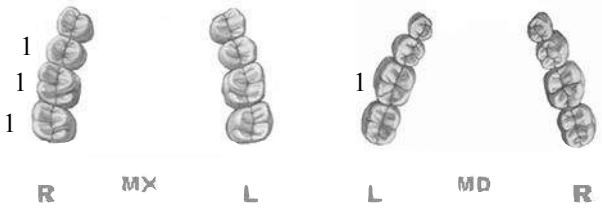
Marginal Ridges

4



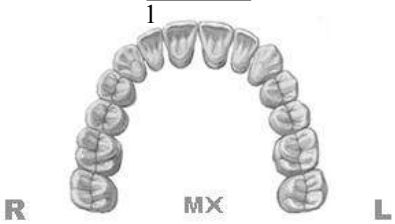
Buccolingual Inclination

4



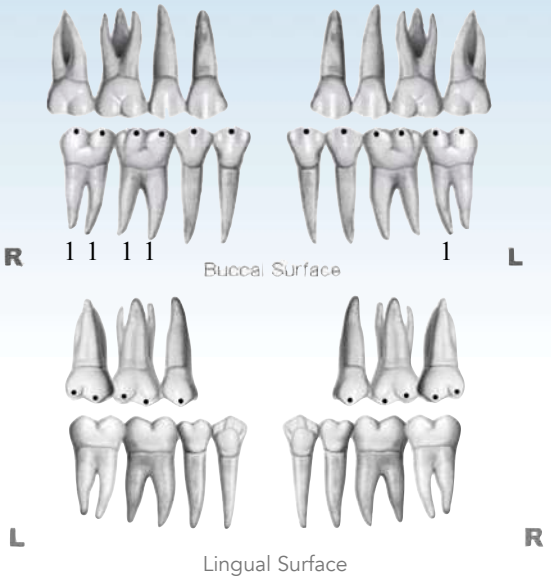
Overjet

1



Occlusal Contacts

5

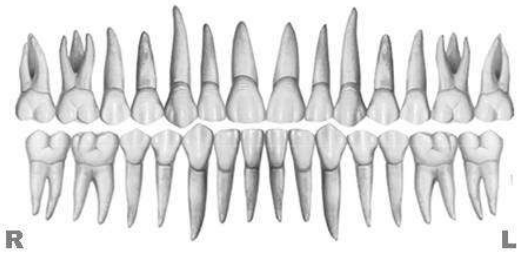


Occlusal Relationships

4

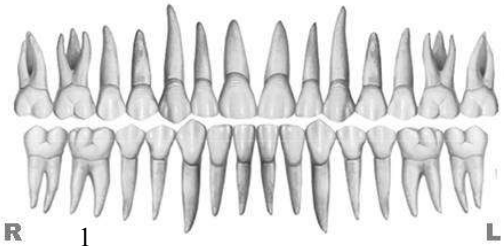
Interproximal Contacts

0



Root Angulation

1



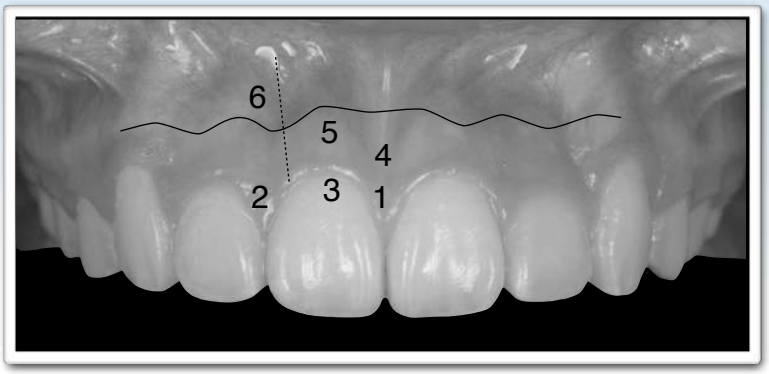
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink and White Esthetic Score

Total Score = 9

1. Pink Esthetic Score

Total = 1

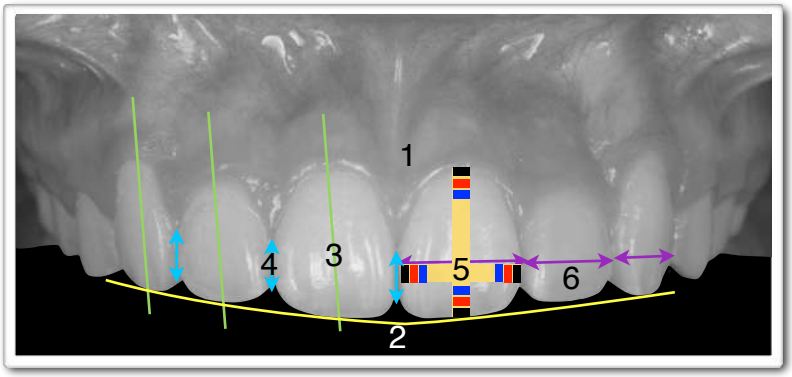


1. M and D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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

2. White Esthetic Score (for Micro-esthetic)

Total = 8



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

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

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

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

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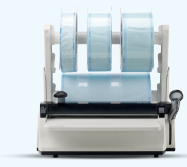

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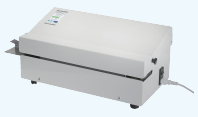

Euromatic®

Sterilization

Autoclaves

E10

E10

Powerful and connected, for first-class sterilisation

Performance

The top Euronda sterilization system is powerful,
it guarantees excellent drying and it is eco-friendly.

Innovation

The new E-Touch, E-Light, E-Timer, E-Help and E-Backup systems put technology at people's service.

Ergonomics

Increasingly user-friendly, with total harmony between the operator, the device and the working environment.

Traceability

The standard connectivity solutions and the print set options offer comprehensive, expandable traceability.

Design

E10's sophisticated, contemporary design brings aesthetic to a new stage.

Safety

New systems guarantee exceptional sterilization quality at all times, from installation to maintenance.

Green light

End cycle, load sterile

Yellow light

End cycle, load wet for prompt use

Red light

Load not sterile

Classification:

Medical Device Class II b
The Class B Autoclave fully conforms to EN 13060 standard requirements.
Stainless steel moulded chamber certified to PED 2014/68/EC

Chamber capacity:

18-24 L

Weight:

47.5 Kg (18 L) - 50.5 Kg (24 L)
(machine empty with basket and trays)

External dimensions (wxhxd):

460 x 455 x 610 mm

Power consumption:

2300 W 10 A

Water consumption:

300 ml

Connectivity:

Ethernet, SD Card and WiFi (optional)

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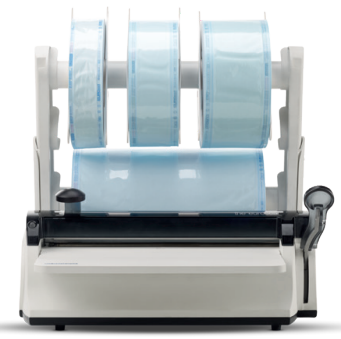
The sealing revolution at your fingertips



Sturdy
Lightweight and cutting-edge materials, built to withstand heavy usage.

Safe
Anti roll-back blocking and scald prevention system, combined with sound and light signals.

Handy
The spacious support surface makes work practical, comfortable and easy.

Versatile
Patented roll holder is adjustable and it can be wall-mounted.

Sealing strip:
12 mm

Sealing area width:
310 mm

Power supply:
200 - 240 V
50/60 Hz

Absorbed power:
100 W

Dimensions (wxhxd):
Standard
456 x 315 x 390 mm
Mounted roll holder
456 x 200 x 300 mm
Double roll holder
456 x 420 x 390 mm

Weight:
7.1 Kg

Euromatic®

Simplifies, speeds up and keeps track of work

Fast
The sealing speed of 8 m/min. combined with multi-band sealing give perfect results in record time.

Adjustable
The temperature can be adjusted from the control panel to ensure the perfect seal with any type of paper.

Traceability
The built-in printer prints data directly onto the pouches. All data can be transferred to a computer using a USB device, a SD Card and a standard Ethernet cable.

Safe
An audible alarm alerts the operator of any matters requiring their attention and the stand-by function automatically activates when the machine is not in use.

Simple
The innovative 2.8" colour touch-screen display, featuring a new user-friendly interface, guides the user through the menu options in a clear and rapid manner.

Accessorizable
A complete range of accessories are available to enhance usability, such as the front sliding table made of satin-finished steel complete with a bench-top roll-holder and cutter unit.

Sealing strip: 12.5 mm

Dimensions (wxhxd):
510 x 215 x 242 mm

Weight: 14 Kg

Power supply:
200 - 240 V
50/60 Hz

Absorbed power:
600 W

Connectivity:
Ethernet, SD Card anf USB

Eurosonic® 4D

A new dimension to ultrasonic washing

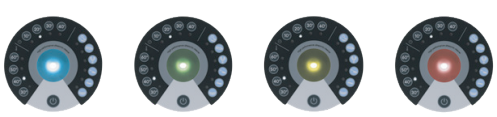
Resistant
Steel body and anti-deformation cover, with non-drip system.

Ergonomic
Side handles facilitate movements; a tap on the back easies emptying.

Efficient
Users can choose between six preset cycles with set times and temperatures, and free cycles with temperatures between 30°C and 60°C.

Simple
LED backlit controller and “luminous progress bar” for simple, intuitive use.

Led backlit controller



Capacity:
3.8 L

Dimensions (wxhxd):
335 x 260 x 205 mm

Weight:
5 Kg
(with basket and cover)

Preset cycles:
- **Instruments** 20 min at 40°C
- **Burs** 10 min at 40°C
- **Impression tray holder** 40 min at 60°C
- **Cement remover** 10 min at 30°C
- **Plaster remover** 30 min at 60°C
- **Prostheses** 40 min at 60°C

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Continous Wave Obturation
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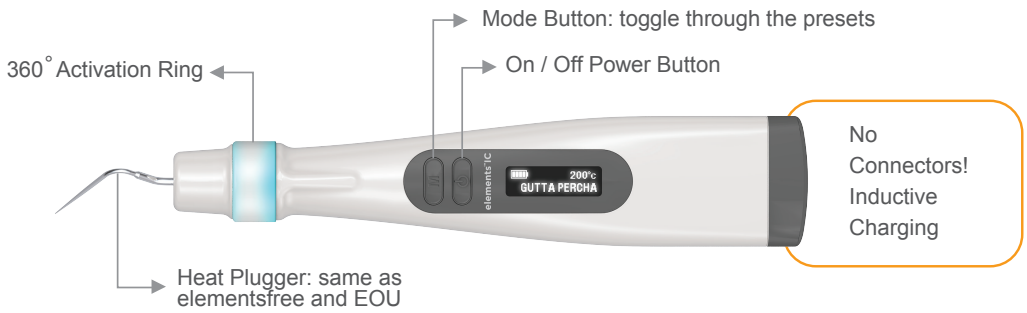
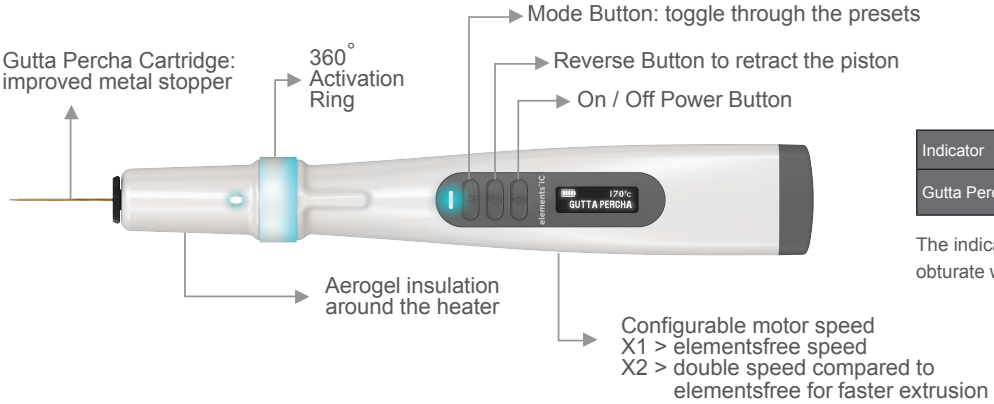
elements™ IC





Indicator	4	3	2	1	0
Gutta Percha Level	Full	75%	50%	25%	Empty

The indicator estimates how many canals you can obturate with the material left in the GP cartridge.

Products

Dental Products Essential Kit

Double Retractors 2.0 Autoclavable!

Double Retractors x2, Black Board x2

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

Stainless Steel Mirror

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

NEW

Bite Turbo 3.0 Autoclavable!

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

A simple and powerful tool to correct severe deep bite and cross efficiently. The handle of Bite Turbo 3.0 is now autoclavable with non-slip design. The bite turbos and lingual button molds, made with silicon and filled with flowable resin, can be reused and adjusted depending on treatment progress. The longer one allows you to solve all kinds of deep bite and large horizontal overjet.

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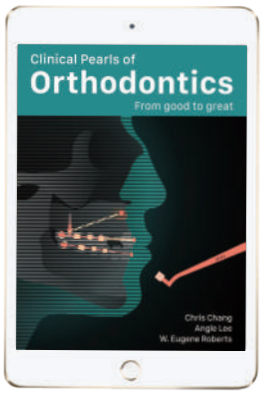
Learn it your favorite way!

Best of all



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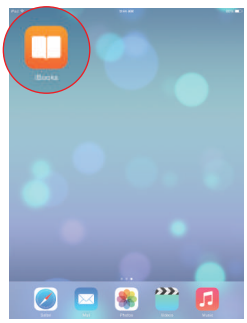

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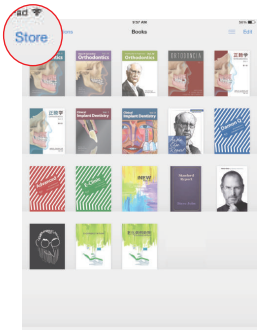

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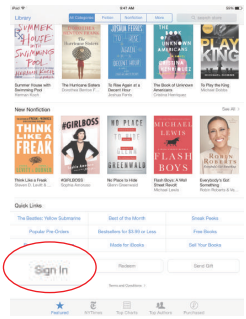

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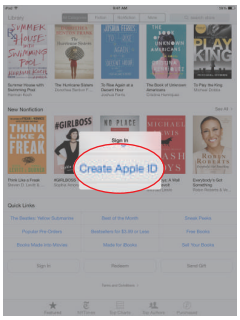
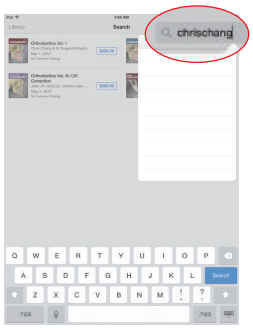


4. "Create Apple ID" if you don't have one.



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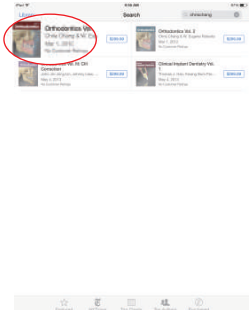

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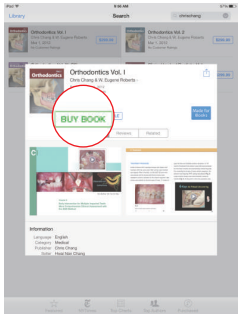

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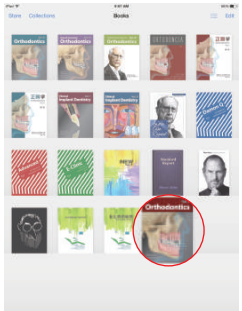

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Chapter 6.
Maximizing Spaces and Resources
- Natural Habitat Aviary

"The true secret of happiness lies in taking a genuine interest in all details of daily life."

– William Morris

Dr. Chang's orthodontic journey began 36 years ago. Along the way, there has been excitement, a sense of fulfillment, and contentment; however, not until the last couple of years has he learned to slow down and step a little off track to appreciate ordinary happiness that occurs while he goes about his daily life.

Bird-keeping has recently become Dr. Chang's new-found passion. Throughout this lifestyle series, his efforts and determination to create a close-to-nature shelter for his feathered companions is apparent and unquestionable. Even so, sometimes it still takes painful experience to develop a fully protected home for the birds so that neither natural hazards nor careless human actions endanger them.

SAFETY is the first and foremost foundation to secure. An interlocking door system design is crucial for keeping birds in an outdoor aviary. When used properly, the space between the two doors serves as a buffer, providing time and space to check for any birds that could have accidentally got past the inner door, and prevents them from actually flying away. If they did, with their splendid plumage that does not fit in with the wilderness in Taiwan, these pet birds would not have a very high chance of survival on their own. To create a more hospitable living environment, the lower part of the aviary is built with waist-high glass walls which act as windshields, whereas the upper part is surrounded with stainless steel mesh (Fig. 1). The mesh walls and ceiling are primarily for ventilation, but also serve for climber plants to provide natural shade, under which the birds can hide from the intense summer sunlight.

Fig. 1: Mesh walls and ceiling allow extended application of the vertical space in the aviary. In a practical sense, ventilation and shading can be created naturally. Attachment of auxiliary perches and climber plants is also made relatively easy, which enhances not only the functionality, but the playfulness and esthetics of the aviary.

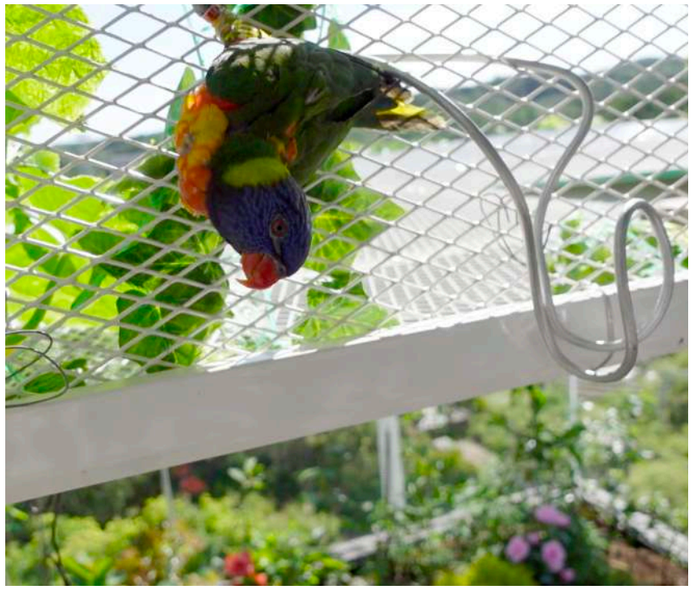


Fig. 2: The mesh wires allow the birds to grab directly onto them. For the more fun-loving birds like this rainbow lorikeet, access to the vertical dimension of the aviary is open for them to dance to their heart's content.

In addition to practicality, the use of mesh also offers opportunities for fun! The wires are by themselves perfect for bird claws to grab onto (Fig. 2), and they also make auxiliary perches easy to attach, allowing its feathered residents to explore the vertical dimension of the aviary (Fig. 3). While the quiet, philosophical ones simply hang up high immersed in the surrounding mountain views, those with moves and rhythm enjoy an extensive stage to dance around on. Even though their excessive enthusiasm literally ruffles the feathers of some of their companions, they elicit entertaining and therapeutic energy to their human friends.

This brings us onto the second key to an aviary that inspires - *PLAYFULNESS*. Recalling the rooftop garden for quail in chapter 2 and the first version of the rooftop aviary in chapter 3, Dr. Chang realized that not much had been done to the ground area, where, aside from plants, bare soil had been left as it was. This greatly reduced the fun for the ground-dwellers, namely, the quail and the ducks. As a consequence, in this upgraded aviary, flat rocks have been laid and stacked up to create low barriers for the non-flying birds to explore (Fig. 4). The gaps and shadows formed between overlapping rocks trigger the quail and the ducks' curiosity, luring them to hop up and down while playfully pecking around looking for potential snacks. Bird seed is purposefully scattered on top of the barriers so that, instead of feeding them like farmed poultry, natural foraging behavior is stimulated, keeping the birds active and adventurous.

In the higher parts of the aviary, fallen tree branches and wires have been hung for the flying birds to perch on. The perches have been so positioned to avoid where the Chang family have planned to accommodate themselves on the aviary

Fig. 3: A higher compartment was reserved at the entrance of the aviary. Not only does it balance out the oppressing sensation for people in an enclosed room with low ceiling, vertical space is also created for the birds to enjoy.

Fig. 4: Low barriers were created out of stacked flat rocks for the non-flying birds to explore. Scattering feeds on top of the uneven terrain stimulates natural foraging behavior, keeping the birds active and adventurous.

floor, so that walkways and seats won't be constantly covered with bird droppings. In other words, both parties are entitled to get the most out of the space, while the effort to accommodate - or, in a less preferred scenario, to tolerate - each other's differences can be minimized.

Finally, to elevate the experience of keeping an aviary to the next level, esthetics and shared enjoyment are essential. The purpose of a walk-in aviary should not be for maintenance only. Instead, being able to actually appreciate spending time in it among the birds is what Dr. Chang is aiming for. With the first two foundations - safety and playfulness - established for the feathered residents, this last key is relatively easy to attain. Plants - leafy or with flowers - are always a good idea, providing privacy and security for the timid inhabitants like the quail, and beauty and serenity for people to enjoy.

Currently, one of Dr. Chang's favorite places to be is in his designated corner of the aviary (Fig. 5). Bringing along his laptop and guitar, he can spend a good few hours there, letting his fingers and mind soar either on the keys of his laptop or on the strings of his guitar. With a simple tilt of head, a panoramic view of the aviary is readily in sight whenever he wishes to stop for a break. This may be a perfect depiction of how work-life balance should look like. It is not always all about efficiency and results, but about appreciating those curious little things in daily life and indulging in the joys hidden in the process.

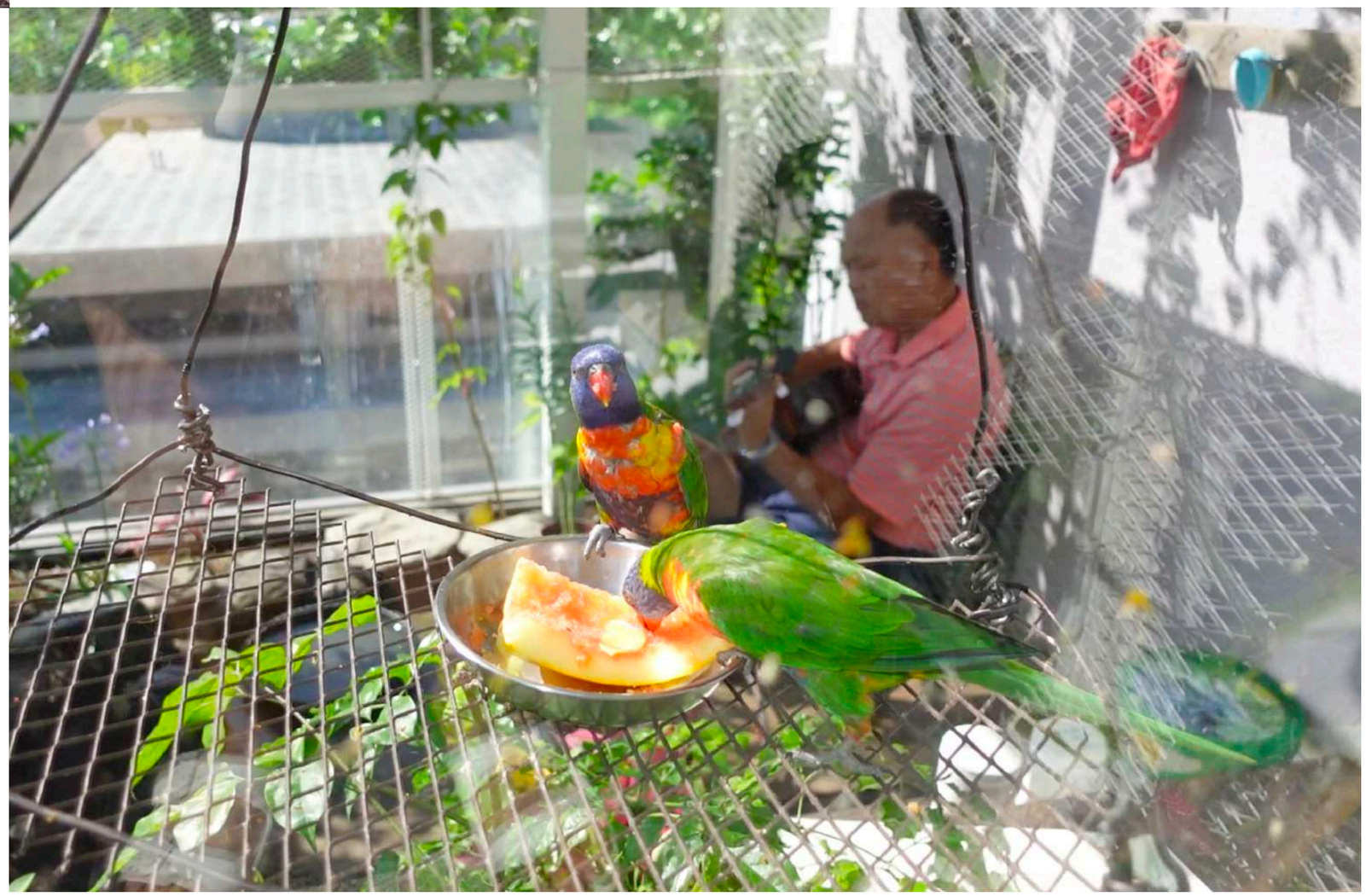
Desk editor of JDO & a wildlife enthusiast*

Annie Chen

*Title bestowed by Dr. Chris Chang

Special thanks to Mr. Paul Head for refining this article

Fig. 5: Dr. Chang enjoys practicing the guitar in the aviary. To his amazement, he noticed the quail and the ducks' tendency to adjust the pace in which they move and walk according to his music. Finding curious little things as such in ordinary daily life might be the true essence of work-life balance.



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New Release!

Dr. Alex Lin and Team Beethoven have recently published their research analyzing various factors related to the success rate of IZC screws in the renowned AJO-DO, issue 161. As Dr. Chang would say, you all have to read it. You SHOULD, and you WILL!