

# Long Term Follow Up and Management of a Severe Class III Open Bite Case

## (A) Introduction

The patient presented with seemingly simple Class III asymmetry with a labially block out left upper canine. The initial treatment plan indicated traditional edgewise orthodontic appliances for better alignment. The patient would then stay in long term follow up until the active growth period was completed and be ready for second stage correction of the asymmetric malocclusion.

However, during the first phase of alignment of the ectopic upper canine, an open bite developed unexpectedly, and worsened progressively. Surgical correction was planned while the mandibular growth remained in close monitoring. The use of buccal shelf mini-screws to correct Class III open bite was attempted and the orthognathic surgery was avoided. Overall, the patient was treated and stayed in follow up over 14 years.

A new modality of the treatment of Class III open bite, and the concepts of etiology and myofunctional therapy of Class III open bite are discussed below.

## (B) Case report



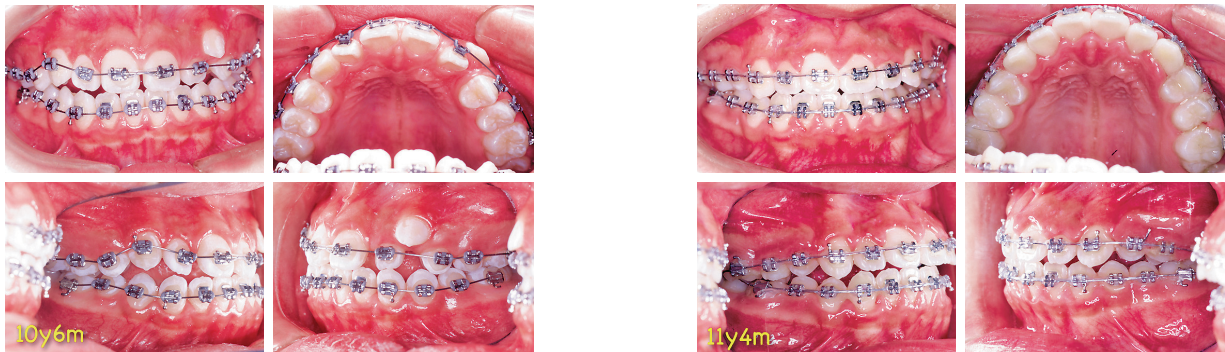


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 Chief Consultant of IJOI  
 President of TAO ( 2000~2002 )  
 Author of *Creative Orthodontics*

■ 10y2m:

**Diagnosis:** This is a Class III subdivision malocclusion case with right side molars in a Class III relationship and Class I relationships for the left side molars. The upper midline was deviated to the left side due to the upper lateral incisor shifting to the left as a result of the labially block out left upper canine. Originally the upper midline should be more to the right, indicating the lower dental midline deviated to the left, and coinciding with the left deviated chin point.

**Prognosis:** After space creation for the left upper canine, the upper dentition was well aligned. Reevaluation and re-treatment were indicated when active growth was completed. The asymmetrical skeletal and dental relationship tended to worsen with growth.

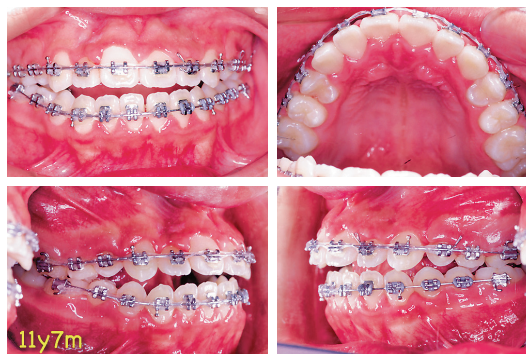


■ 10y6m:

Beginning of traditional edgewise orthodontic treatment.

■ 11y4m:

The upper canines were in good alignment. The lower dental midline, compared to the upper dental midline, was still slightly deviated to the left.



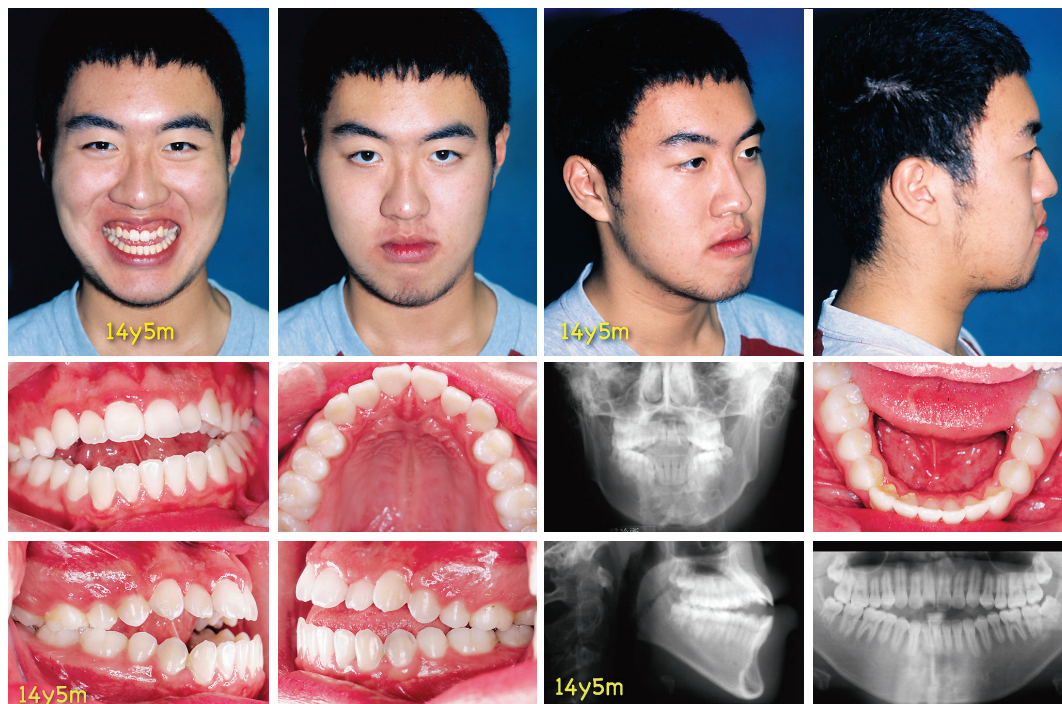
■ 11y7m:

After 13 months of orthodontic treatment, the ectopic left upper canine was aligned, but the anterior open bite was gradually developed. The edgewise orthodontic treatment was then stopped. The patient remained in follow-up for future re-evaluation. The author explained to the parents and patient about possible future surgical corrections.



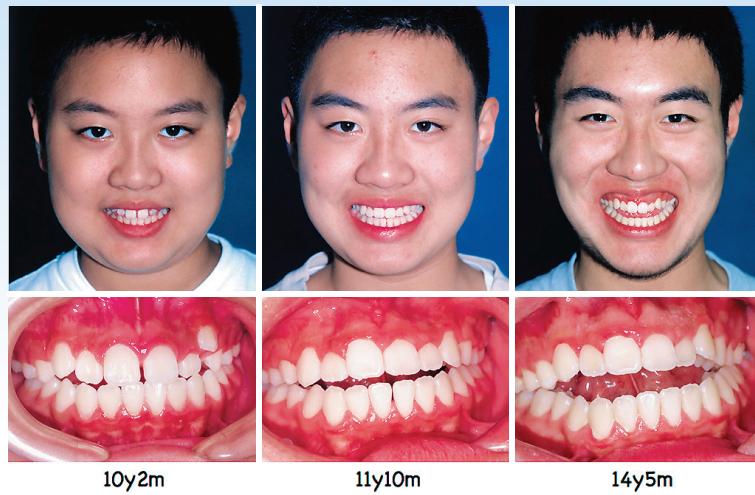
■ 11y10m :

After debonding, the patient was found with an anterior open bite, and the lower dental midline was deviated to the left. Only the left side second premolars and the posterior molars were in occlusal contact.



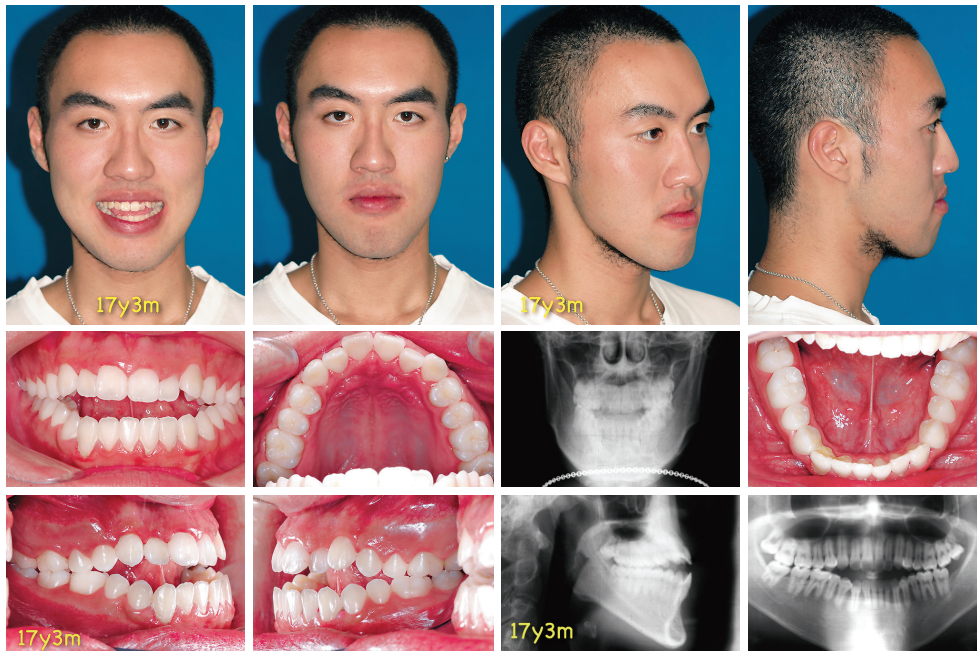
■ 14y5m:

The anterior open bite worsened and only the posterior molars were in occlusal contact. In addition, the lower midline was further deviated to the left, coinciding with the left deviated mandible.



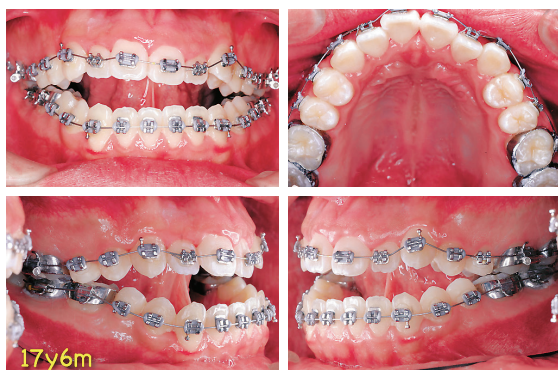
■ 10y2m - 11y10m - 14y5m :

Comparing the smiles before and right after treatment, it seemed that either the patient developed a gummy smile or his smile became bigger.

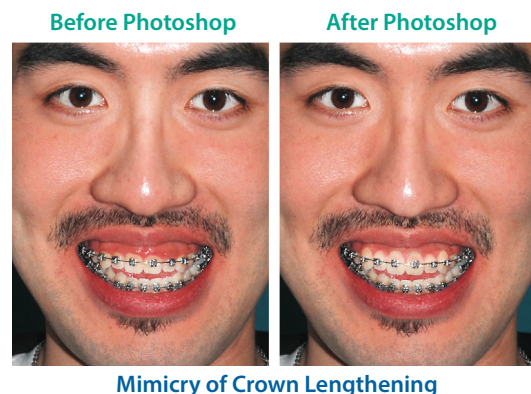


■ 17y3m:

The anterior open bite, Class III malocclusion, and the left deviated lower dental midline as well as the left deviated chin point all became more severe.

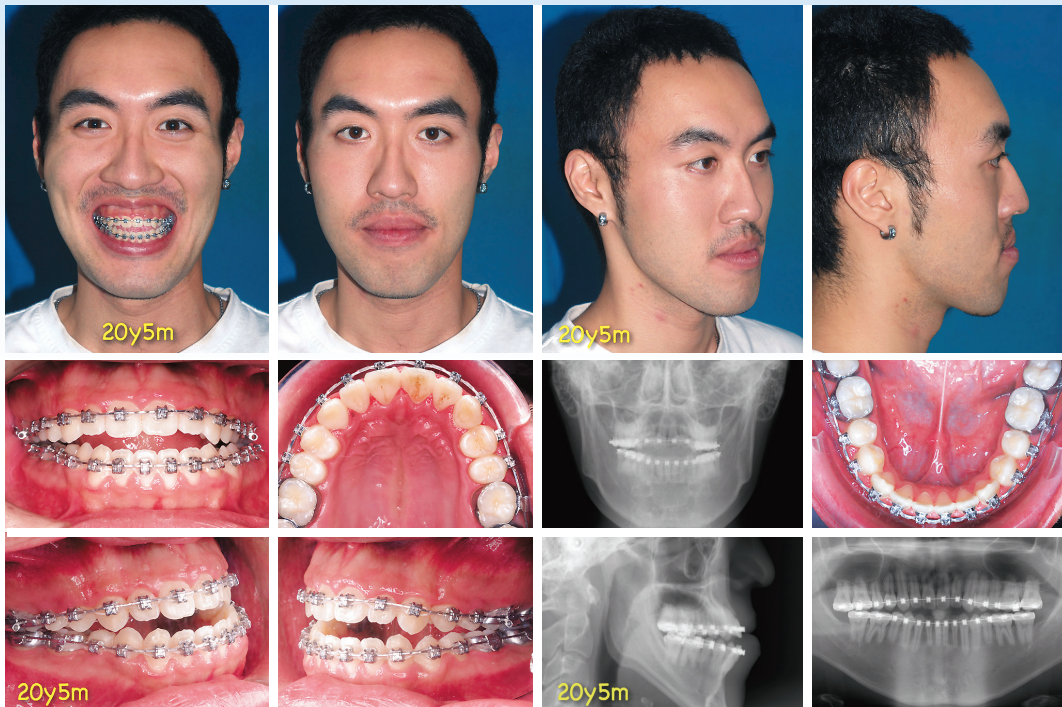


■ 17y6m: Bonding for pre-surgical orthodontic treatment.



Mimicry of Crown Lengthening

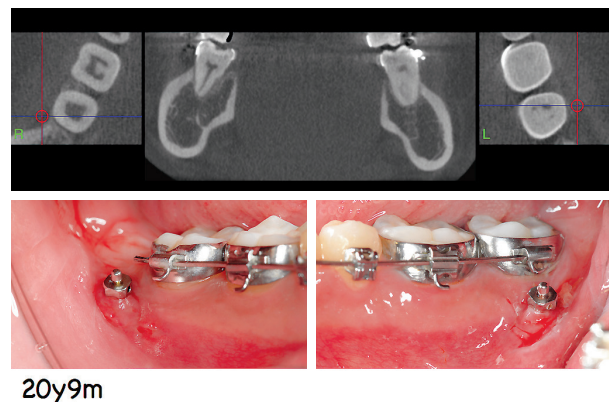
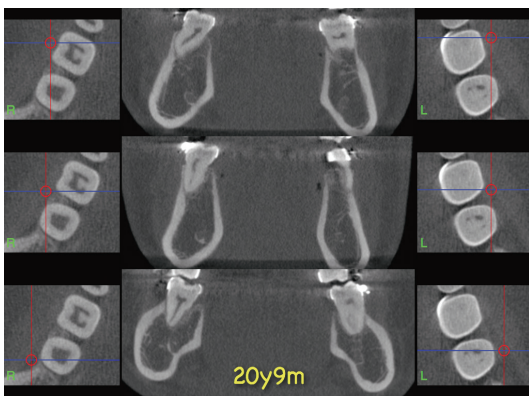
■ Projected outcome photo of crown lengthening by Photoshop



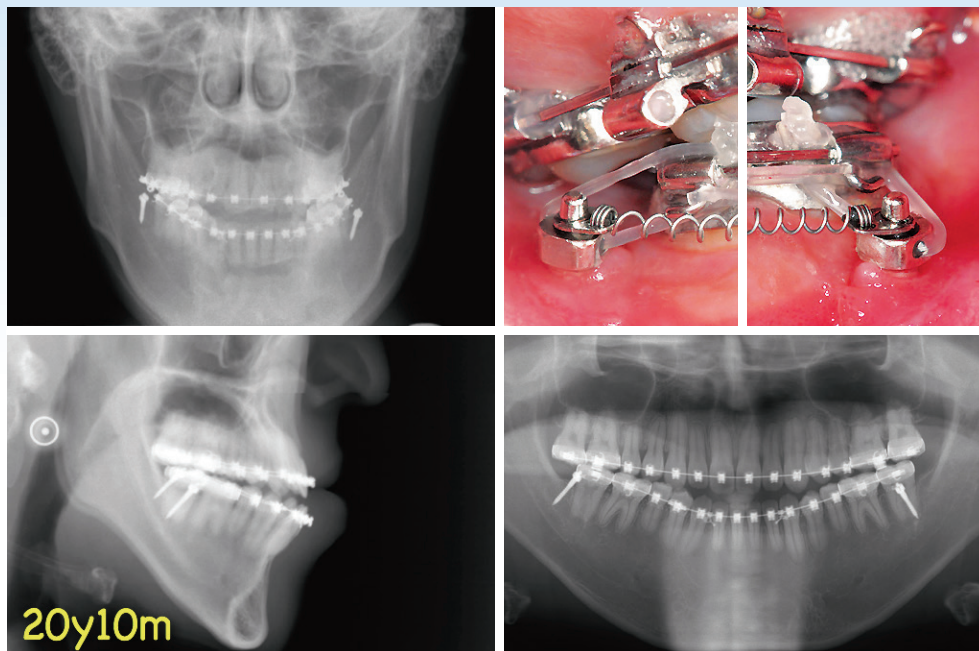
■ 20y5m:

The patient was ready for surgical corrections of the severe Class III open bite and deviated lower dental midline. After consultation with the oral surgeon, maxillary Le Fort I surgical impaction, mandibular setback surgery and advancement genioplasty were planned.

- The projected satisfactory outcome of crown lengthening indicated that the gummy smile could be resolved without the Le Fort I surgery. Instead, the severe Class III open bite could be corrected by buccal shelf mini-screws.
- Before surgical placement of the buccal shelf mini-screws, computed tomogram (CT) was taken to determine the placement sites of the buccal screws.

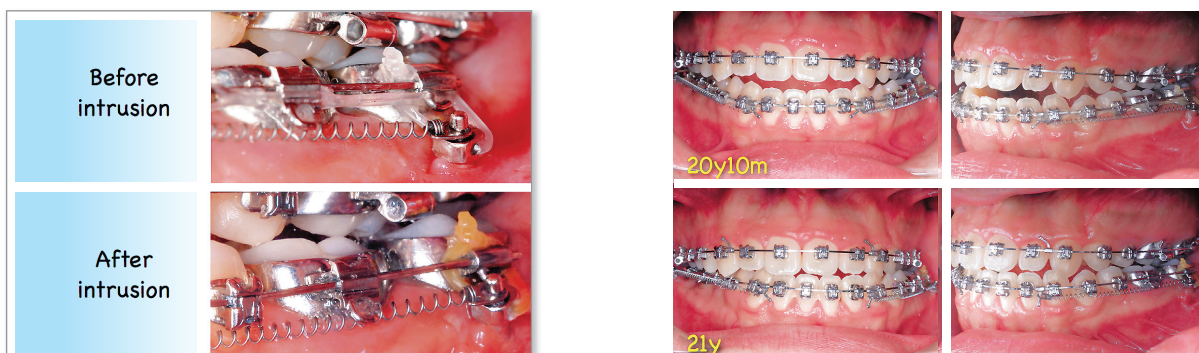


- The CT revealed that the thickest slope of buccal shelf was over the distobuccal corner of the right lower 2<sup>nd</sup> molar, and the buccal side of the left lower 2<sup>nd</sup> molar.
- Two stainless steel buccal shelf mini-screws (2x12mm) were placed with an apically positioned flap around

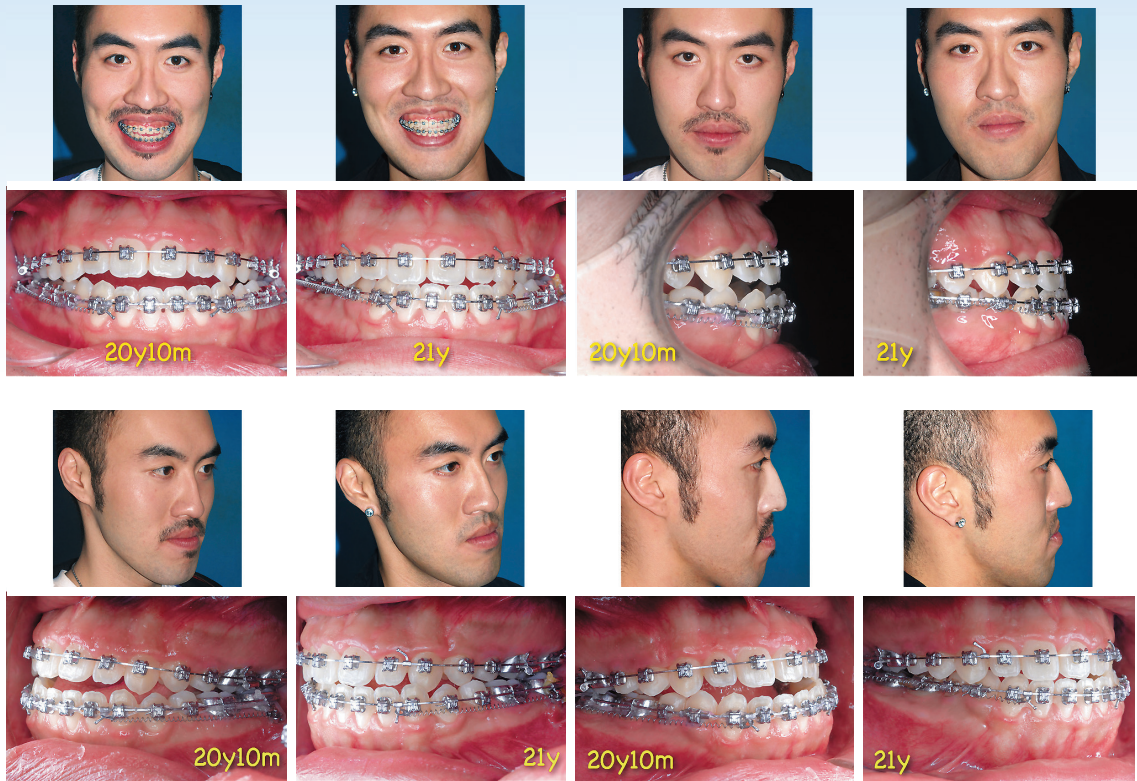


the screws. This flap could secure the mucosa apically. As such, irritation could then be prevented and the denuded periosteum would become attached gingiva after healing.

- Lateral cephalogram showed the open bite.
- PA cephalogram showed the buccal shelf mini-screws were almost parallel with the molar roots.
- This extra-radicular placement of the screws made the distalization of the whole lower dentition possible.
- The panorex showed that the screws were placed over the buccal side of the lower left 2<sup>nd</sup> molar and over the distobuccal side of lower right 2<sup>nd</sup> molar.



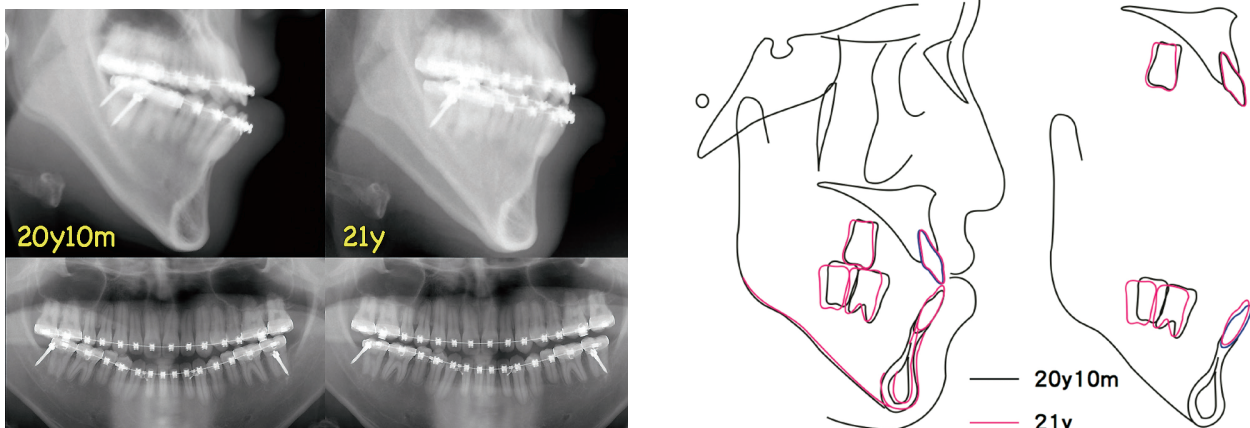
- Closed coil springs were used to retract the whole lower dentition distally (16oz on the right side and, 12oz on the left side) for the correction of the lower midline deviation. Square elastic threads (0.26" x 0.26"; Rocky Mountain, Co.) were tied from the buccal tube of lower second molars to the holes of the platform of the stainless steel screws to intrude the lower molars, and solve the anterior open bite. No lingual holding arch was used in the lower dentition.



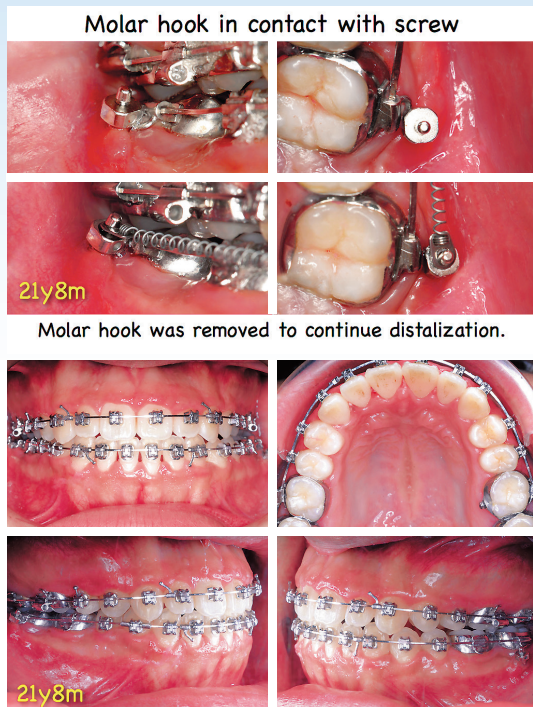
■ 20y10m - 21y:

Results of 2 months of intrusion of molars and retraction of the whole lower dentition.

The Class III malocclusion was much improved and the open bite was closed to an edge to edge relationship in just only two months as the result of lower molar distalization and intrusion of lower molars.



The cephalometric superimposition indicated true intrusion of the lower molars and mild autorotation of the mandible. These changes turned the previously slightly retrognathic mandible orthognathic. The counter-clockwise rotation of the occlusal plane facilitated the correction of the Class III malocclusion<sup>1</sup>.

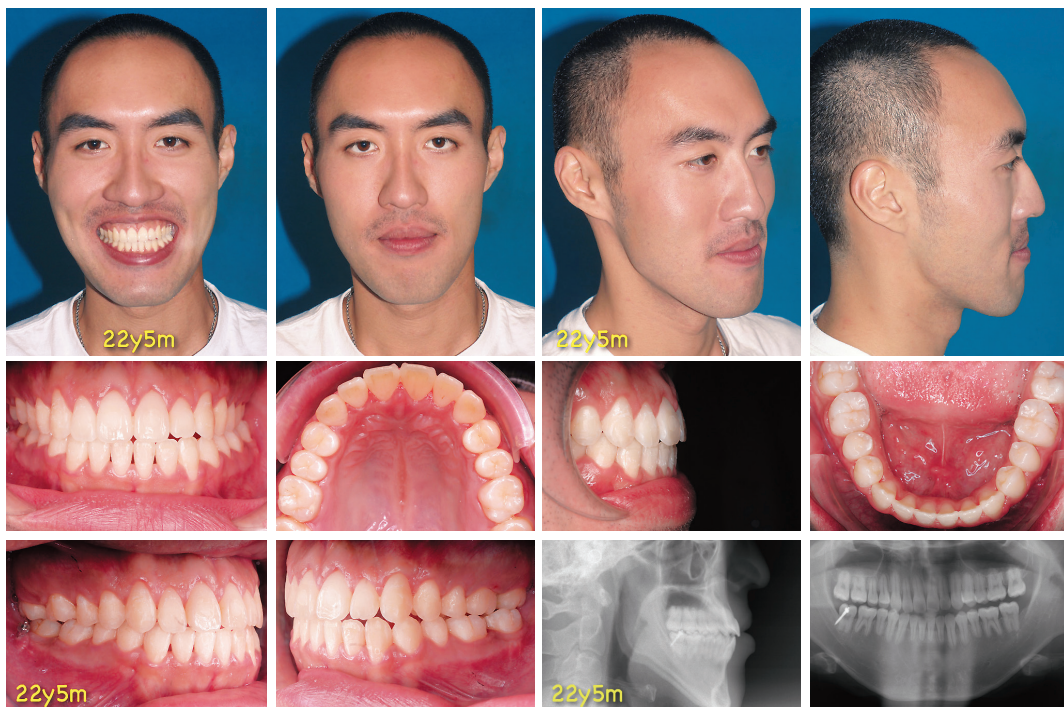


■ 21y8m:

The 2<sup>nd</sup> molar hook was in contact with the screw which prevented further retraction of the whole lower dentition. It was later ground off to continue retraction of the whole lower arch.

■ 21y11m:

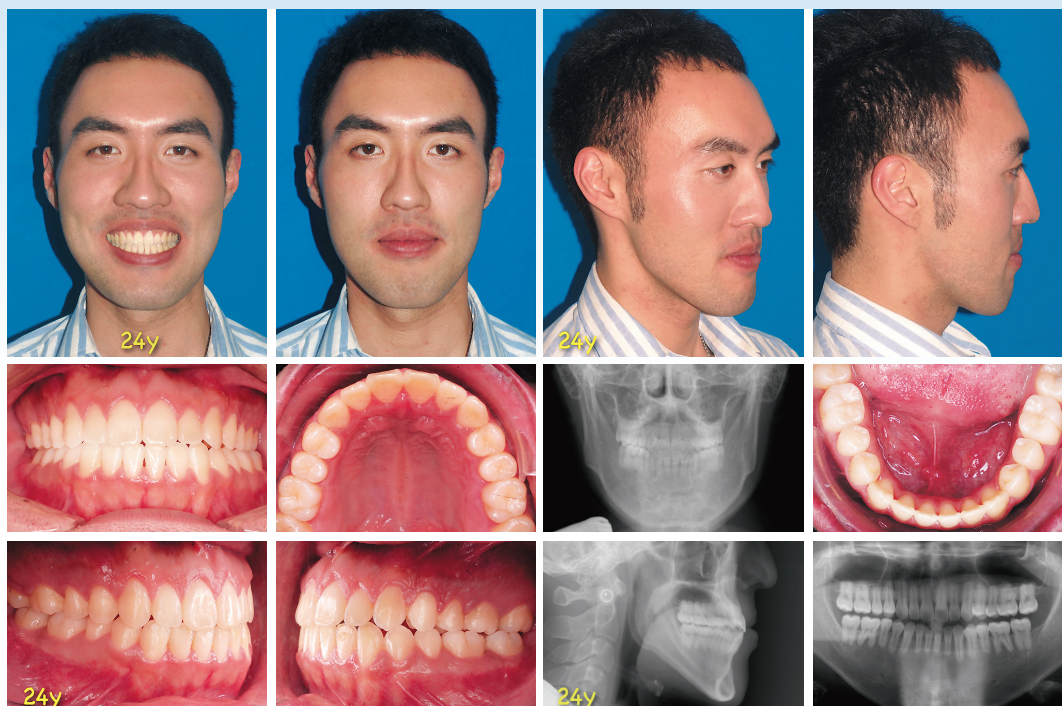
Results of the crown lengthening procedure of the upper anterior teeth performed by the periodontist.



■ 22y5m:

Overcorrection to a deeper overbite was planned to prevent relapse of the open bite. However, the treatment had to be terminated even though the overbite was just about 1mm due to the patient's impending military service. No significant changes was observed in the post treatment profile. The mandible remained deviated to the left, and the gummy smile was corrected with the crown lengthening surgery. The overjet was 2mm and overbite was 1mm. The canines and molars were in a Class I relationship on bilateral buccal occlusion. The left side remained in a slightly open contact over left first bicuspid region.





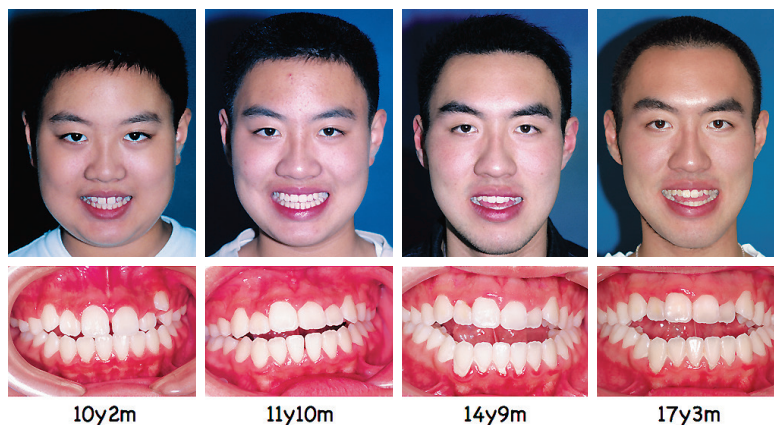
■ 24y:

*In the 1-year-and-7-month follow up visit, the overjet was found to relapse to 0.5mm, while the overbite, despite no overcorrection was performed, remained to be 1mm. No obvious bite opening was observed. The right buccal occlusion stayed in a solid Class I relationship while the left side settled better. Mild open contact over the left upper canines and first premolar region were found. The mandibular dentition relapsed horizontally and moved forward while the vertical overbite was well maintained.*

(C) Case Summary

(1) Stage one treatment (Before growth completed).

This Class III subdivision case appeared to be one with an easily treatable upper ectopic canine. After 13 months of traditional edgewise treatment, the bite opening continued worsening. Therefore, the treatment was temporary suspended.

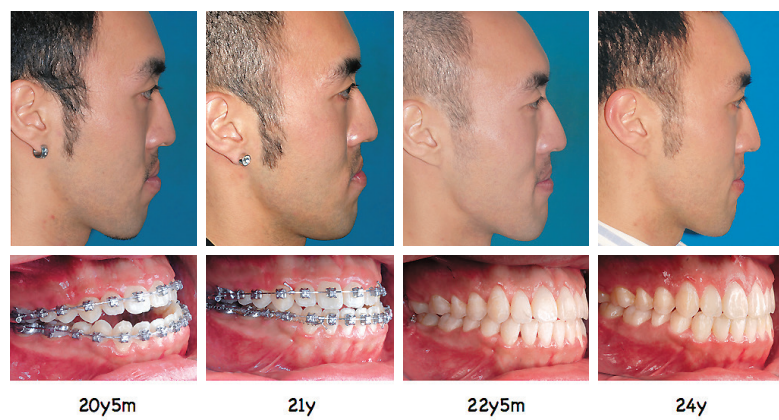
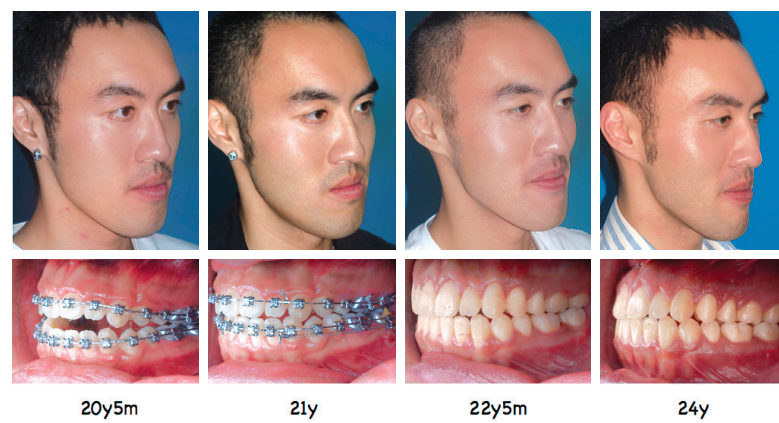
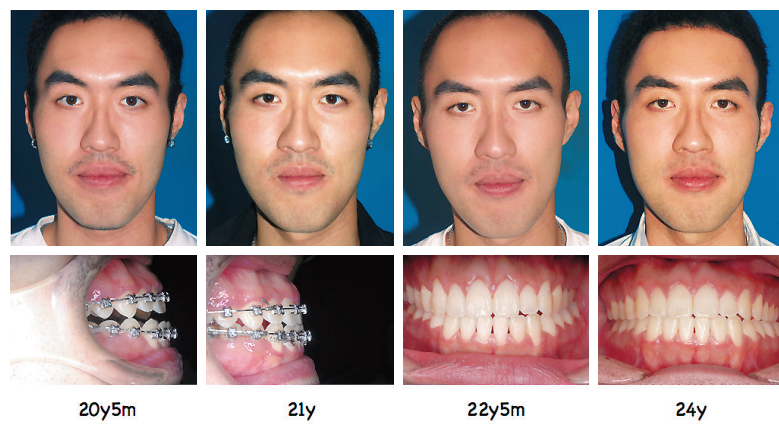
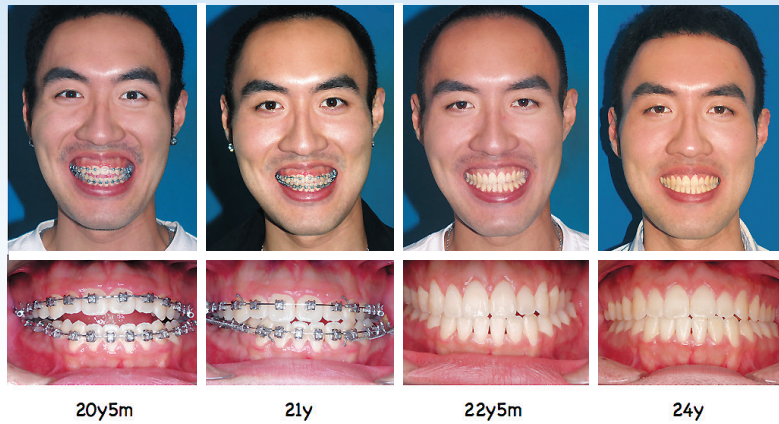




The patient was in follow up throughout the growing period. Photographic records indicated that the bite, as well as the deviated dental midline and chin point, deteriorated progressively. At the age of 17 years and 3 months, the patient was ready for the second stage pre-surgical orthodontic treatment.

## (2) Stage two treatment (Post major growth period)

The second stage orthodontic treatment was planned to prepare for subsequent surgical correction. After re-evaluation, the use of buccal mini-screws was applied to correct the open bite malocclusion. Meanwhile, the gummy smile was corrected by the crown lengthening procedure, instead of the Le Fort I surgery. 1 year



and 7 months after the treatment, the occlusion slightly relapsed but the overbite was well maintained. No open bite relapse was found despite neither tongue guard nor any myofunctional therapy was instructed.

#### (D) What can we learn from this case?

- (1) The original orthognathic profile, and shallow overbite Class III malocclusion gave little indication that this would evolve into a severe Class III open bite case. So far there is no precise indicators with predictability of Class III growth. Luckily such cases with severe Class III open bite growth, as in the present case, are uncommon.
- (2) It was advised to stop the early stage of Class III treatment when the bite kept opening during the treatment. Efforts to resist the vertical growth of the mandible would be difficult and futile, and the patient would have to wear braces for a prolonged duration, leading to a series of periodontal problems and caries. Luckily the 2<sup>nd</sup> stage treatment was delayed until the major mandibular growth stopped. The new method of using buccal mini-screws to correct severe Class III open bite became available and surgeries were avoided.
- (3) This patient presented initially as a typical severe Class III subdivision case. Indeed, the dentition and chin point deviated progressively to the left with growth as expected.
- (4) The recent advancement of the temporary anchorage devices (TADs) can solve many traditionally surgical Class III cases, as long as patients can accept the profile. Many difficult Class III can be treated with conventional orthodontics with the aids of TADs.<sup>1</sup>
- (5) Projected images of treatment results, utilizing digitally (*ie. Photoshop*) modified visuals, is an effective tool for patient consultation, as in this present case for predicting future treatment results of crown lengthening.
- (6) Although inter-radicular placement of the buccal shelf mini-screw is technically less challenging than the extra-radicular placement, the screw may come in contact with the roots, causing screw loosening. Besides, the amount of distalization is limited with this method.<sup>2</sup>
- (7) There are some Class III open bite cases with a little retrognathic mandible instead of prognathic mandible, as in the present case. Intrusion of molars and auto-rotation of the mandible are advantageous for open bite closure and profile improvement. 2mm x 12mm stainless steel miniscrews with holes on the platform makes the intrusion of lower molars a very easy procedure. This type of buccal shelf mini-screws is critical to the successful treatment of this open bite case.
- (8) The author suspects that the tongue habit or breathing problem are not the main etiologies of this type of severe Class III open bite cases. Hence, no muscle training, ie swallowing exercise, or the use of tongue guard or chewing gum exercise were instructed to the patient.<sup>3</sup> The author had two other similar cases in the past. So far the one and half years of follow up records all indicate satisfactory stable results with no open bite relapse.

## REFERENCES

1. Lin JJ. Creative Orthodontics: Blending the Damon system & TADs to manage difficult malocclusions. 2<sup>nd</sup> edition. 2010, Yong Chieh Enterprise Co, Ltd., Taiwan.
2. Nakamura A, Teratani T, Itoh H, Sugawara J, Ishikawa H. Photoelastic Stress Analysis of Mandibular Molars Moved Distally with the Skeletal Anchorage System. Am J Orthod Dentofacial Orthop. 2007;132:624-9.
3. Kondo E. Muscle Wins! - Muscle and respiration oriented orthodontic treatment and long term occlusal stability - Ishiyaku publishers, Inc. 2007.

## Acknowledgements:

The authors would like to acknowledge Dr. Nancy Nie-Shiuh Chang for performing the crown lengthening surgery and placing the buccal shelf mini-screws in this case; Dr. Liao You-Cheng for precise ceph tracing; and Ms. Tzu-Han Huang for English editing.

### Dear Dr. Chris Chang:

Hi! I am Brian S. Lee, an Korean American practicing orthodontic treatments in South Korea.

Currently, I almost treat all of my patients with Damon system occasionally with the help of TADs.

Recently, I had found from the internet and 'Youtube' about Taiwan Damon study group (*the beethoven dental group*). I had read some of the articles that were published on the International Journal of Orthodontics and Implantology (IJOI). **Most of them were very clear and easy to understand what the authors were trying to say.** To tell the truth, the articles written by the American clinicians in the Clinical Impressions (CI) were broad and sometimes vague to grasp what they were trying to say.

From the articles I had the sense that these Taiwanese orthodontists know what they are doing to their patients in order to give a better facial esthetics. That is the treatment I sincerely want to provide to my patients.

Recently, I have signed up to become a member on the iAOI website and get more information about the orthodontic philosophy suggested by Taiwanese clinicians.

Through the research, I have seen the book "Orthodontics" by Chris Chang, W. Eugene Roberts (2012). I want to ask you if it is possible to buy this book. I currently don't know where to purchase this textbook. Please let me know if you have some of them in stock. If you have them, I will buy it by credit cards.

Thank you for your time and patience. Have a good one.

Sincerely,



*Brian*

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at Gwangju (South Korea)  
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