18-year Follow Up of two Siblings with Class III Malocclusion

(A) Introduction

Treatment of skeletal Class III malocclusion with conventional orthodontic appliances usually requires orthognathic surgery. If patients have an acceptable profile, temporary anchorage devices (*TADs*)[1] and passive self ligating brackets, including the Damon system,[1] are viable alternatives for some Class III malocclusions.

Early treatment of severe (*skeletal*) Class III malocclusion with the so-called orthopedic appliances, such as face masks, has been reported. However, long term follow up studies found relapses due to late mandibular growth.[2] It is difficult to predict facial growth, but longitudinal long term follow up of patients with Class III malocclusions provides insight into the optimal management of these challenging malocclusions.

This case report documents the treatment, relapse and retreatment of two siblings over a period of 18-years. The emphasis will be on the need for early treatment,[3, 4, 5, 6] the importance of the E-space management and the MEAW effect of the Damon system.[1]

Initial examination indicated that the older brother (*left*), aged 6-year-7-month, had a moderate anterior crossbite and midline deviation with an orthognathic profile. His younger sister (*right*), presented at age 2-year-11-month with a more severe anterior crossbite and midline deviation with a more prognathic mandible.

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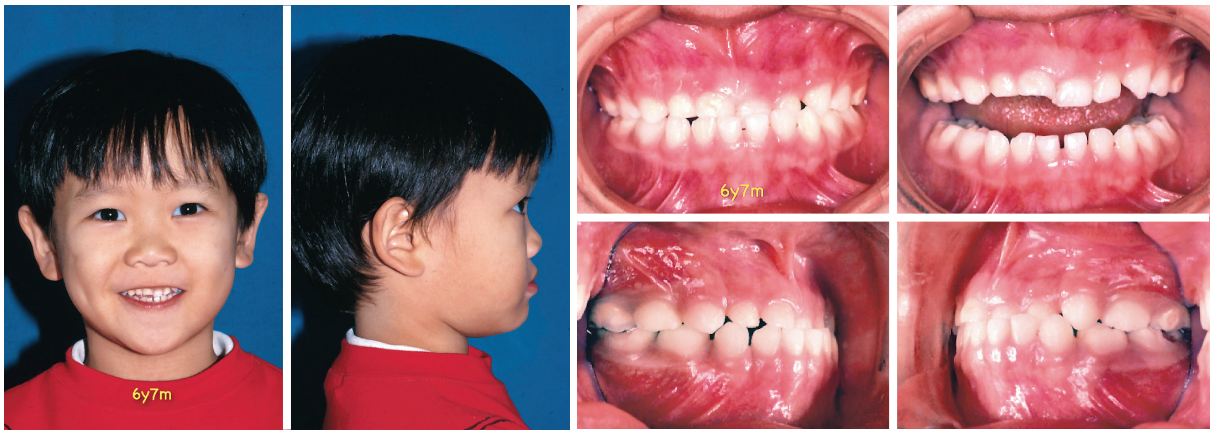
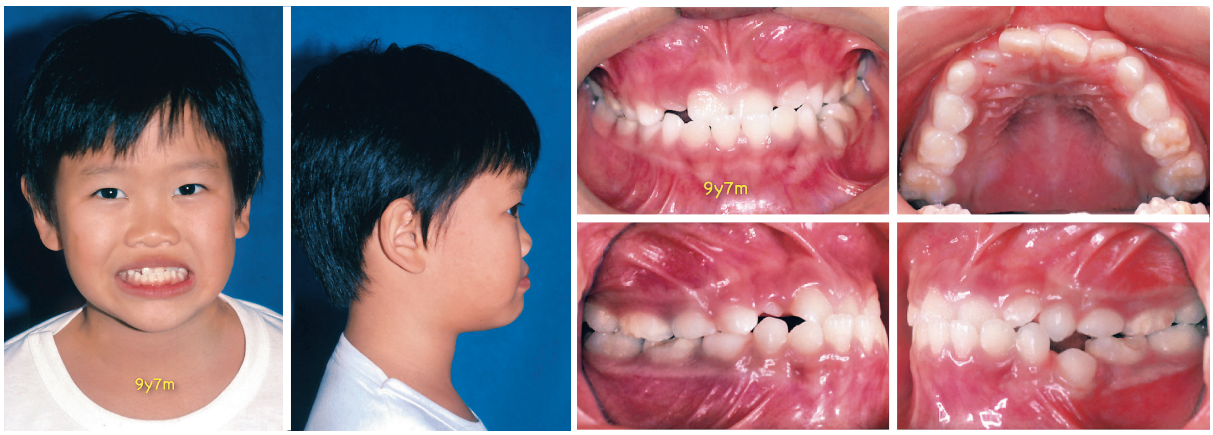
(B) Case 1: The older brother



■ 6y7m

A mild mesial step relationship of the primary second molars was noted bilaterally. The lower dental midline was deviated 2mm to the left of the upper dental midline. The left upper primary incisors were in crossbite. The frontal view of the face revealed that the chin was deviated to the left and the lateral view showed an orthognathic profile.



■ 9y7m

The chin point was deviated to the left, and the lateral profile was slightly prognathic. The mesial step relationship of the primary second molars had worsened. All the erupted maxillary permanent incisors were in crossbite, and the lower dental midline deviation to the left was more pronounced.

12y4m

All the primary teeth exfoliated. Some residual E-space was present in the right lower premolar region. Traditional edgewise orthodontic treatment began to resolve the anterior crossbite by closing the E-space and correcting the dental midline. The chin point was still deviated to the left and the lateral prognathic profile was more pronounced.

13y10m

Closing the right lower E-space produced a Class I occlusion, but the chin point was still deviated to the left and the mandible was slightly prognathic.

14y4m

6 months later, the occlusion has relapsed to an edge to edge incisal relationship, and the lower dental midline was deviated 1mm to the left. The problems arising from late mandibular growth were explained to the parents and patient, however, retreatment was not indicated until the completion of at least most of the mandibular growth.

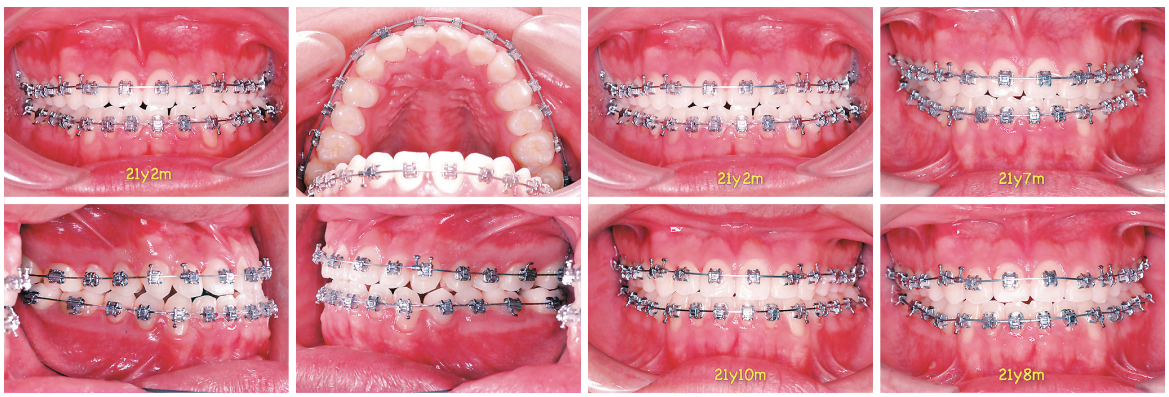
The chin point remained deviated to the left, and the lateral profile was moderately prognathic.

17y9m

The chin point was still deviated to the left and there was a slightly prognathic facial profile. The right buccal segment had evolved into a 5mm Class III molar relationship and and the lower dental midline deviation had increased to 3mm.

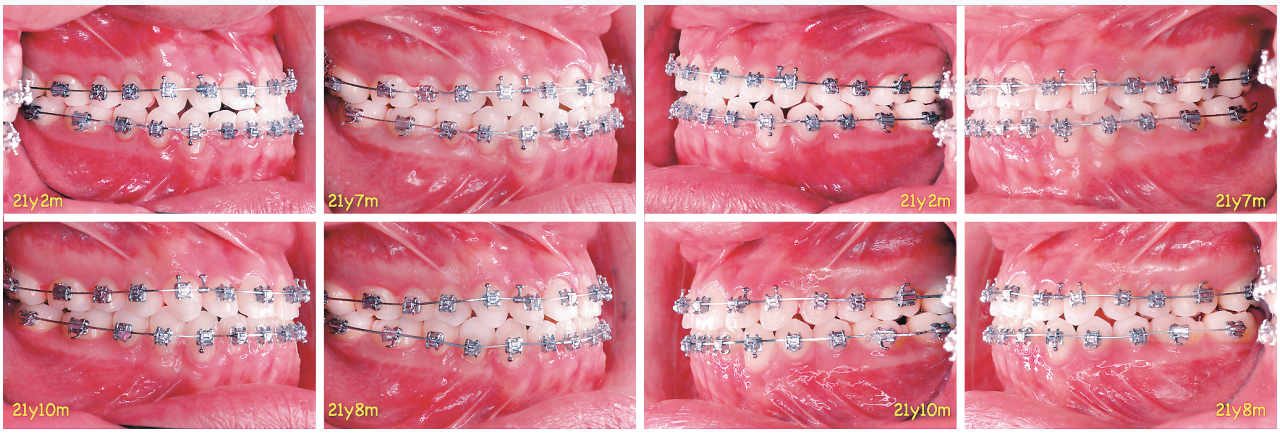
20y3m

The mandibular deviation, midline discrepancy, and facial profile was unchanged since the previous records obtained at 17y9m of age. Since the patient was not concerned with the mandibular deviation, mandibular prognathism or lip protrusion, non-extraction orthodontic treatment without orthognathic surgery was planned.



21y2m

Second stage, nonextraction orthodontic treatment was with a full fixed appliance (*Damon II, Ormco*).



21y2m - 21y7m - 21y8m - 21y10m

The patient was very cooperative in wearing intermaxillary elastics, so after 10 months of orthodontic treatment, a Class I occlusion was achieved.

22y

Although a Class I occlusion was achieved, the lower dental midline remained slightly deviated to the left. The deviation of chin point to the left side was minor, as was the protrusion of lips. The profile remained mildly prognathic. Overall, the patient was very satisfied with the final result, which was well interdigitated Class I occlusion.

24y10m

After 2 years and 10 months, the treatment result was stable, except for a moderate relapse of the right buccal segment into a slight Class III molar and canine relationship. The midline deviation to the left had increased to 2 mm and the chin was more prominent. The profile was slightly prognathic. Despite the minor relapse, the patient was satisfied with the overall result.

22y-22y11m-23y9m-24y10m

The patient was 22 years old when the retreatment was completed, because no further mandibular growth was anticipated. However, the lower midline continued to deviate to the left side and the overbite decreased.

Discussion of Case 1

What we can learn from this case:

(1) Due to late mandibular growth, treatment of Class III malocclusion during adolescence may relapse.

(2) The deviated chin and dental midline discrepancy were clearly evident when the patient was only 6 years and 7 months old. These characteristics continued to predominate as the patient grew older.

(3) The correction of the dental midline discrepancy could have been facilitated by placing a lingual arch to preserve his right mandibular E-space at around age 11 before the primary molars exfoliated.

(4) Although the E-space was not fully preserved in this case, the first phase of orthodontic treatment did benefit from the E-space that remained.

(5) Correction of anterior crossbite often results in proclined upper incisors. If the E-spaces are preserved, the lower incisors can be retracted to help correct the crossbite with little or no need for Class III elastics. That approach would avoid the undesirable side effect of anterior tipping of upper incisors. In addition, over-correction of midline could be achieved easily.

(6) The correction of this asymmetric Class III malocclusion relapsed in only 6 months due at least partially to the continuing mandibular growth. If retreatment were to begin at age 14 years, the late mandibular growth would have compromised the treatment result again.[2] Therefore, second stage treatment is recommended only after mandibular growth is completed.

(7) The retreatment was completed in only 10 months, indicating that the Damon system can generate MEAW-like effects.[1]

(8) The second stage treatment was finished when the patient was 22 years old, after his mandibular growth appeared to be completed, the follow up examination indicated that dentally the lower dental midline relapsed to the left again. For better long term treatment result, over-correction is recommended.

(9) It is difficult to provide a thorough diagnosis based on the primary dentition. A more definitive diagnosis can be made when all the permanent teeth are present, as in this case at the age of 12 years old. Until a proper diagnosis can be provided, clinicians should not begin any early orthopedic correction.

(C) Case Report 2: The younger sister

■ 2y11m

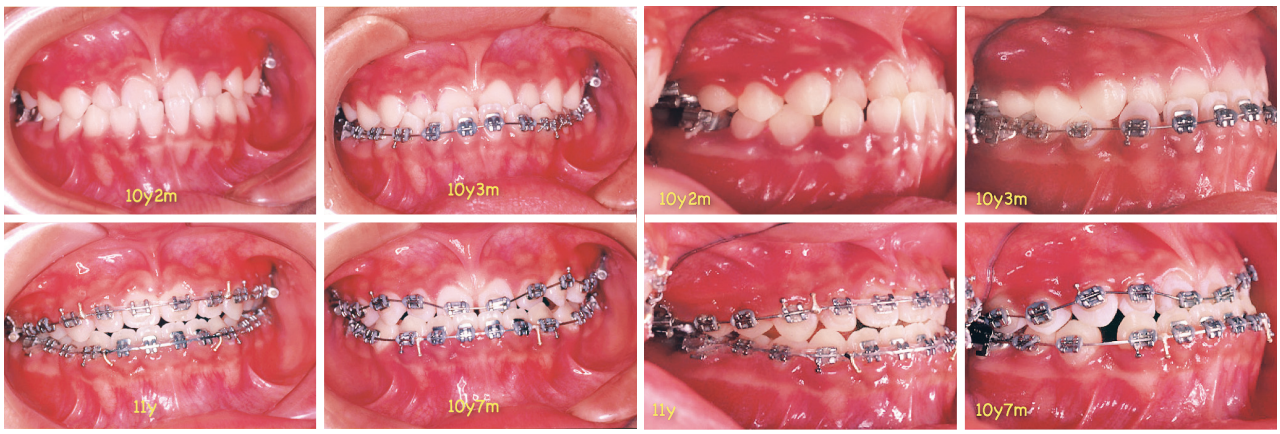
The patient was only 2-year-11-month but she exhibited cooperative behavior during examination and record collection. The frontal view of the face revealed that the chin was deviated to the left side, and the profile was prognathic. The lower dental midline was deviated to the left of the upper dental midline. An apparent mesial step relationship of the second deciduous molar was found on the right side buccal occlusion, and the lower deciduous canines were in a significant Class III relationship. The mesial step buccal occlusion was less severe on the left side.

■ 8y8m

The chin point was deviated to the left and the lateral profile was prognathic. A full cusp Class III malocclusion was noted bilaterally, and the lower dental midline was deviated 1mm to the left. Large mandibular deciduous second molars were present, so a lingual holding arch was placed to preserve the E-spaces bilaterally.

9y7m

The chin point was still deviated to the left side but the dental midlines were coincident. The permanent premolars have erupted, and the E-spaces were preserved in the lower arch.



10y2m - 10y3m - 10y7m - 11y

The use of traditional edgewise brackets, combined with the available lower E-spaces, helped retract the protruded lower dentitions to almost edge to edge without the use of Class III elastics.

11y6m

After 1 year and 3 months of treatment, the anterior crossbite was corrected primarily by the closure of E-spaces with minimal use of Class III elastics. Thus, the undesired side effect of anteriro tipping (*proclination*) of upper incisors was avoided. After the first stage treatment, the parents were informed that despite the successful correction of anterior crossbite, the deviation of lower midline and chin point persisted, and the correction would probably deteriorate with late mandibular growth.[2] Follow up evaluation for retreatment was indicated.

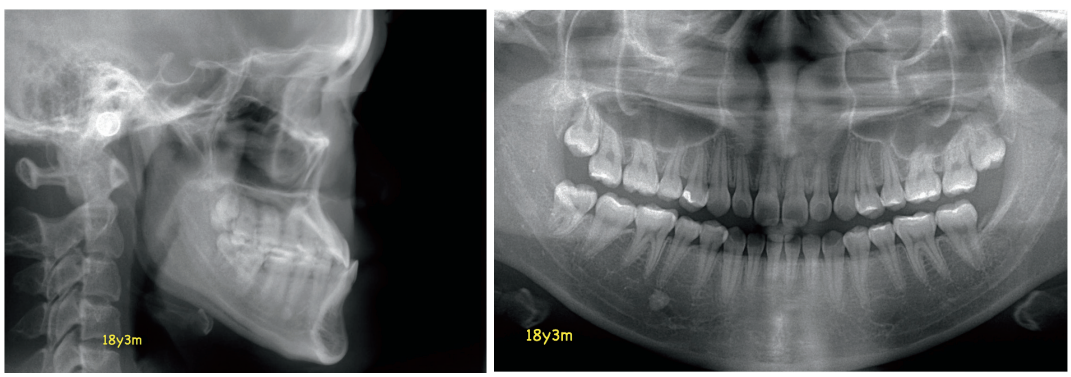
12y2m

Eight months after active treatment, the lower dental midline deviation to the left increased and the overbite became edge to edge. The profile remained prognathic.

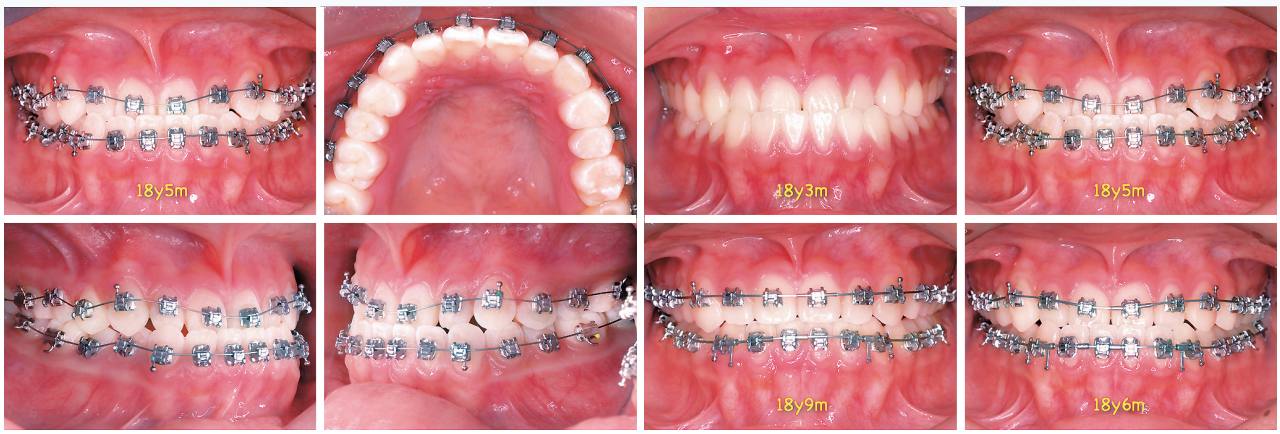
■ 16y7m Both the anterior crossbite and the prognathic mandible have become more prominent.

■ 18y3m

After reevaluation, the parents and patient were informed that surgical correction was indicated if an orthognathic profile was the ultimate treatment goal. The parents and patient accepted the prognathic profile and requested orthodontic treatment only.



■ 18y3m Cephalogram and Panorex.



18y5m

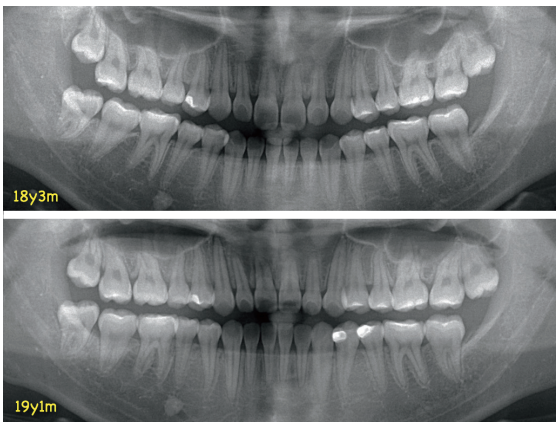
Start of the second stage orthodontic treatment. A fixed appliance (*Damon II brackets, Ormco*) was bonded on both arches.

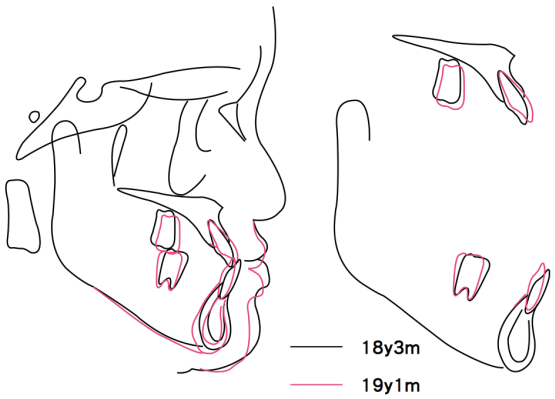
18y3m - 18y5m - 18y6m - 18y9m

With the patient's excellent cooperation in wearing Class III elastics, and the MEAW effects of the Damon system,[1] the Class III malocclusion was corrected to Class I in only 4 months.

19y1m

After 8 months of active treatment, ideal overbite and overjet were created, and the dental midline was almost coincident. Although the patient's lateral profile remained prognathic, it was acceptable for the patient and her parents.

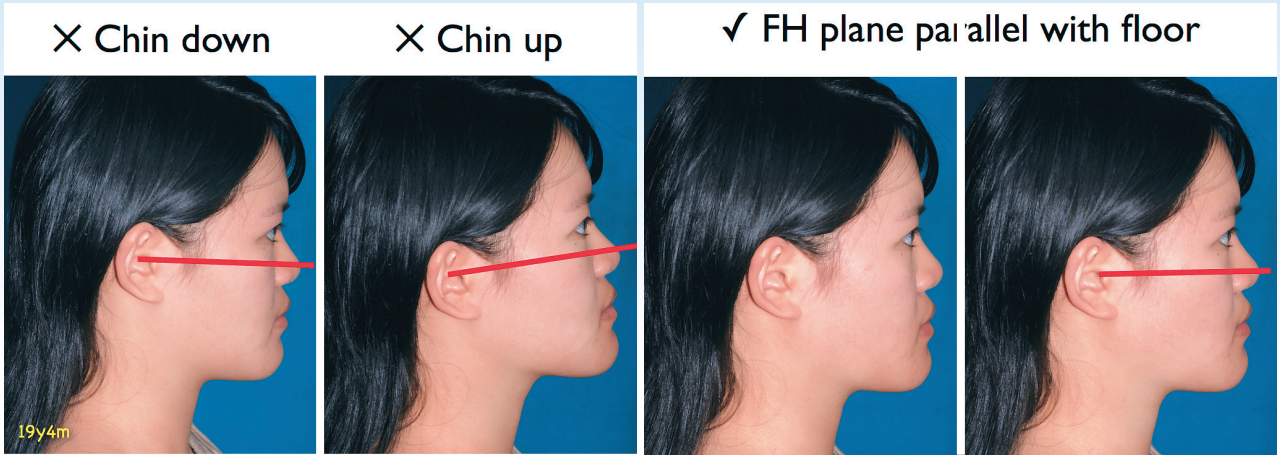




18y3m vs 19y1m Cephalometric superimposition

The panoramic view clearly indicated that the lower molars were tipped back distally, similar to the MEAW effect, resulting in the final Class I relationship. The occlusal plane was rotated counterclockwise due to the tip back of the lower molars and extrusion of lower incisors. Both the right lower third molar and upper right third molar were in a good position, so they were retained.

The presence of a lower third molar did not prevent tip back and retraction of the whole lower dentition.

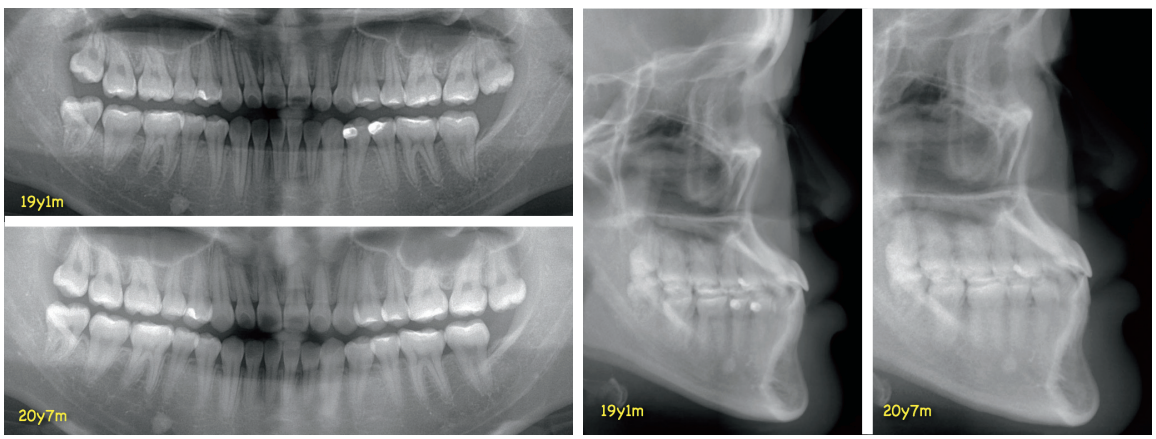


■ 19y4m

When taking clinical profile photographs, the patients' head should keep in a natural position, defined as the Frankfort horizontal plane parallel to the floor. When the chin is tilted downward, it tends to appear orthognathic and more prognathic when tilted upward.

■ 20y7m

At the 18-month follow up examination, both the overbite and overjet decreased



■ 19y1m vs 20y7m

The cephalometric comparison revealed significant reduction of the overbite and overjet.

Discussion of Case 2

What we can learn from this case:

(1) This patient already exhibited characteristics of skeletal Class III malocclusion in the early primary dentition stage. After informing the parents about the possibility of late mandibular growth, only minor orthodontic alignment was done. No aggressive extra-oral appliances such as chin cup or face mask were used. This case was treated with Damon II brackets, and there was only one torque option available in Taiwan at that time. Therefore low torque brackets couldn't be applied to the upper incisors. Nowadays, the Damon Q system provides various torque options. If the author were to retreat this patient, upside down standard brackets would be used to express super low torque effect on the upper incisors. When combined with the use of .019x.025" stainless steel wire on the upper arch, the forward proclination of upper incisors due to the application of Class III elastics can be better controlled. In this case, the upper incisor tipped anteriorly as demonstrated by the cephalometric tracings, but it was not apparent clinically. The patient was very satisfied with the treatment result.

(2) If early treatment were to be conducted during early mixed dentition, there would have been no E-space present. The treatment would reply on Class III elastics, leading to severe proclination of the upper incisors. In this case, the first stage treatment didn't begin until permanent premolars were present. The anterior crossbite was corrected primarily by retracting the lower anterior segment. Therefore, the proclination of upper incisors was relatively insignificant.

(3) After the patient turned18 years old, the Class III malocclusion relapsed and deteriorated. Since the patient was indifferent to her prognathic profile, orthodontics only treatment was indicted. With the Damon system's MEAW effect,[1] the Class III malocclusion was swiftly corrected in just 8 months. It would probably have been a longer and much more difficult treatment if traditional edgewise brackets had been used.

(4) Many clinicians suggest that the correction of Class III malocclusion should start as early as possible.[3, 4, 5, 6] However, that approach usually results in significant protrusion of the upper incisors. Moreover, future mandibular growth may further compromise the result, and complicate second stage treatment.

(5) In this case the Class III malocclusion was easily and simply corrected by Damon II brackets without rapid palatal expansion. In fact, most Taiwanese Class III patients don't require upper arch expansion. When the Class III relationship is corrected, there is no posterior crossbite, in most cases.

(6) When taking clinical photographic records, one should always ensure patients' lateral profile view is in a natural head position, i.e. Frankfurt horizontal plane parallel to the floor.

(7) Overcorrection of the anterior crossbite and midline discrepancy is indicated because Class III malocclusions usually have a tendency to relapse..

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