

Figure 1. Class III malocclusion.

Treatment for Class III Malocclusion: Surely we can do better?

If your young child develops a Class III malocclusion, are you willing to tell them they are confined to the surgical table?

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“Harvold’s series of experiments, in which he blocked noses of primates to induce mouth breathing, resulted in a range of malocclusions...”

Class III malocclusion has previously been one of the most difficult to treat. A misconception is that East Asian populations have a higher prevalence, however, it occurs in 4% of the Japanese population,¹ 1.75% of the Chinese and 0.5-4% of the Caucasian population.²

Is the problem with the maxilla or the mandible?

A Class III can comprise a retrognathic maxilla, prognathic mandible, retroclined lower incisors or proclined upper incisors, or a combination of all these components.

It has been reported that two out of three skeletal Class III malocclusions have a retrognathic maxilla (Figure 1).³ Regardless of this fact, no child has ever been born with a Class III malocclusion; it always develops over time.

Since we know the prevalence begins at nil and increases with age, it follows that early treatment should at least be attempted. Despite this

fact, many practitioners still work under the outdated premise that malocclusion is mainly genetic and thus the only option is late treatment, with surgery.

Orthognathic surgery (Figure 2)

“Too complicated, too invasive, too time-consuming, too expensive and too unpredictable.”⁴

Such is the characterisation by Professor William Bell, known as the “Godfather” of orthognathic surgery, recipient of the AAOMS Research Award and William J. Giles Award for major contributions to oral and maxillofacial surgery and having published 150 papers and edited three-volume textbooks on the subject.

Despite this, there seems to exist an almost blithe inattention amongst the profession to the “surprisingly large”⁵ rates of instability and the “many possible complications” thereof.⁶

Proffit’s 2007 review incorporated over 100 research papers and approximately 50 invited contributions and book chapters, which has yielded data on 2264 orthognathic surgery patients.⁷

“There does come a time when the mandible has postured forwards irretrievably, rendering surgery the only option. However, it is clear we must do all we can to avoid this...”

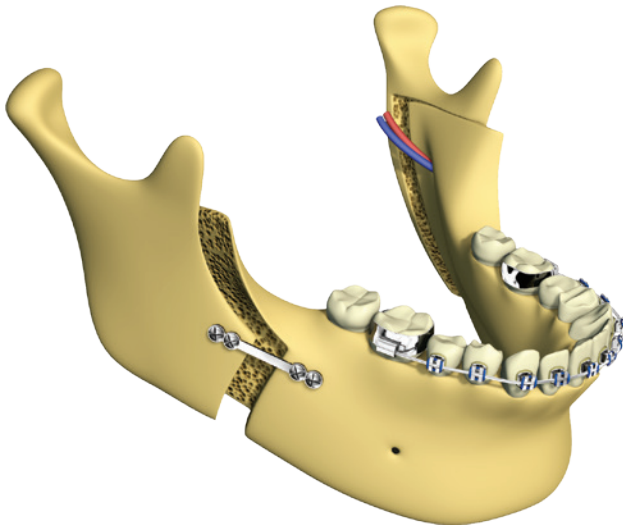


Figure 2. Orthognathic surgery.

“Problematic” describes mandibular setback, downwards movement and widening of the maxilla in the first post-surgical year, with mandibular setback and downwards movement of the maxilla without rigid fixation showing 67% to have moderate relapse and 20% having a “highly significant change”.

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Early treatment with facemask and chin cup

Until Delaire’s⁸ pioneering techniques in 1997, we used to think it was impossible to protract the maxilla; previous efforts resulted in only tipping of the upper incisors. The latest, largest, highest quality systematic review and meta-analysis⁹ on facemask therapy yielded an unsurprising conclusion: it works in the short-term in the mixed-dentition (skeletal changes are best seen at the age of eight or below), however, more research is required to assess its long-term stability.

The effects include forward displacement of the maxilla; however, the chin cup (Figure 3) also causes backward displacement of the mandible and clockwise rotation of the mandibular plane. Especially when intervening in growing patients, rotating the mandible backwards may be detrimental to airway, facial profile and TMJ health.



Figure 3. Chin cup for mandibular restraint circa 1900 (Figure from Angle EH. *Treatment of malocclusion of the teeth and fractures of the maxillae*. 7th ed. Philadelphia: SS White Dental Mfg Co; 1907).

Early treatment with facemask and late treatment with surgery have previously been the most popular options, however, we should only decide on treatment modality after contemplation of the causes.

What causes a Class III malocclusion?

We all previously believed that Class III was completely, or at least mainly, genetic. This outdated dogma has now been firmly interred by modern research, especially with greater knowledge of the human genome. We now know that while the importance of genetics cannot be overlooked, the overriding factors are environmental.

Genetic component

A number of reports have isolated various genes and expression of specific growth factors associated with the development of a Class III malocclusion.

However, Rabie et al. (2003)¹⁰ found it was the initial forwards posturing of the mandible that triggered the expression of *Ihh* and *Pthlh*, which promote mesenchymal cell differentiation and proliferation. In another rat study, IGF-1 also increased significantly when the mandible was repositioned forwards.¹¹

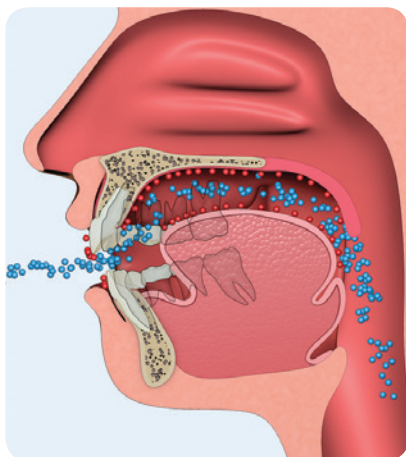


Figure 4. Poor myofunctional habits such as mouth breathing, lowered tongue positioning and incorrect swallowing can affect craniofacial development.

These and other studies led Xue et al (2010) in their review entitled, “Genes, Genetics and Class III”, to declare that Class III genes are only triggered by activation of environmental factors and this should allow us to prevent its development with early treatment.¹²

Environmental component

It is now accepted that genes do not determine growth and form, but rather provide factors that may affect the responsiveness of cells to environmental stimuli.

The relationship of tongue posture and development of Class III has been discussed for decades, however, it is still debated as to whether it is a correlative or causative association. Primozic et al (2012) found that tongue posture is significantly lower in Class III subjects.¹³ Multiple studies using ultrasound under the chin have also documented the relationship between tongue posture, swallowing and craniofacial development.¹⁴

Perhaps most telling has been Harvold’s series of experiments, in which he blocked noses of primates to induce mouth breathing and therefore low tongue posture. What followed was a range of malocclusions, but all included increased face height, steeper mandibular plane and larger gonial angle. Harvold’s summation was that oral respiration was the trigger factor, but it is “deviant muscle recruitment” which directly causes the malocclusion.¹⁵



Figures 5a-b. Case 1 prior to treatment; and after 12 months using the Myobrace® Interceptive Class III series and the Farrell Bent Wire System™ (BWS™).



Figure 6. Case 1 prior to treatment; and retention of treatment outcome after five years.

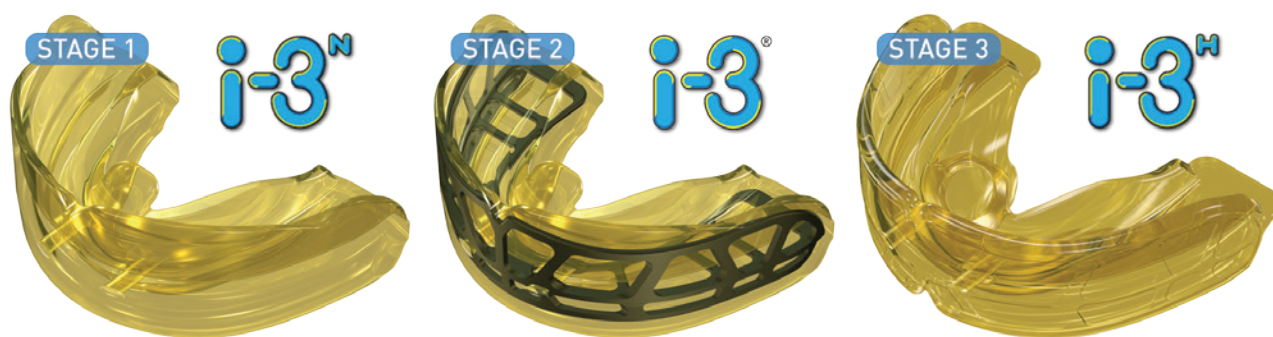


Figure 7. Myobrace® Interceptiv Class III appliance series; i3N provides habit correction, i-3® focuses on arch expansion and i-3H delivers final alignment and retention.

How do we treat the cause of a Class III?

Since we know that environmental factors are responsible for its expression and we know that tongue posture has an intimate link, it dictates that our treatment plan must be early and myofunctional.

A case in point is the 8½-year-old boy who presented with a concave profile and anterior crossbite shown in Figures 5-6.

His mother was an experienced dental assistant who was not content to wait for the condition to worsen and necessitate surgery. He was treated with the *Interceptiv Class III Myobrace®* range (Figure 7), together with *Myolay™* (composite build-ups on lower deciduous molars) and the *Farrell Bent Wire System™ (BWS™)*.

Maxillary development was certainly a component of the treatment; however, the most important factor was retraining tongue resting posture and function to cease continued forward development of the mandible and promote sagittal displacement of the maxilla.

The profile after 12 months improved considerably. However, unlike facemask and chin cup therapy, no retractive forces were placed on the mandible. Every Class III malocclusion begins as a deficient maxilla and when we intervene early enough, we simply do not need to rotate the mandible clockwise.

Almost every approach when it comes to Class III malocclusions display promising short-term results. However, no approach has yet directly targeted the environmental causes or displayed satisfactory long-term results.

That is, perhaps, until now.

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To find out more information about how to begin implementing The Myobrace® System and begin experiencing increased patient volume visit myoresearch.com.