Finally catching up to its counterparts overseas, the Australian Society of Orthodontists (ASO) should be commended for acknowledging, “chronic mouth breathing and snoring/sleep apnoea can also impact on developing teeth and jaws, and are often signs that a child would benefit from an early orthodontic assessment”.  

Although the ASO now declares, “your orthodontist is often the first person to identify airway and breathing problems in children...”, the signs and symptoms are actually easily first recognised by the general dentist at the child’s very first dental check-up appointment.

Despite the dominant flavour in orthodontic literature these days being that mouth breathing can be the most significant factor in Class I and II malocclusions, there somehow remains a small faction that considers Class III malocclusions to have a purely genetic origin.

Genetic factors

The wide misconception that Class III malocclusion has mainly a genetic origin began with Strohmayer’s 1937 analysis of the Hapsburg family (Figure 1). However, studies analysing other large noble European families have found considerable variances, suggesting the mandibular prognathism was heavily influenced by inbreeding and an autosomal recessive pattern.

Indeed, studies have shown genes associated with increased condylar growth in prognathic patients are actually triggered by the forwards positioning of the mandible; this suggested that treating the environmental factors that lead to this initial forward posturing is essential in preventing the development of a Class III malocclusion.

Figure 1. Emperor Charles V (1500-58) had a Class III malocclusion that is now thought to be due to inbreeding, rather than an inherited trait (Royal Collection Trust/© Her Majesty Queen Elizabeth II).

Environmental factors

A study published recently in the American Journal of Orthodontics and Dentofacial Orthopedics (AJODO) examined the relationship between nasal resistance, adenoids, tonsils, tongue posture and craniofacial development in Class II and Class III patients.

ENT specialists have long accepted the effects of mouth breathing on craniofacial development, describing the phenomenon as “Adenoid Facies” or “Long-Face Syndrome”. In fact, Danish ENT Wilhelm Meyer discovered the association between enlarged adenoidal issue and retrognathic mandibles as early as 1868. However, studies such as this are also confirming the observation amongst ENT specialists that enlarged tonsils can have a significant relationship with prognathic mandibles; tonsils that encroach on the oropharyngeal airway lead to the patient posturing the tongue forwards to open the airway, which therefore carries the mandible into a protrusive position.

Your role in interceptive treatment of Class III Malocclusion

By Dr Derek Mahony, Orthodontist and Founder of Full Face Orthodontics and Dr Rohan Wijey, Clinical Director, Myofunctional Research Co.
Breathing assessment for the general dental check-up

Although it is seemingly simple to diagnose a mouth breather, you must remember that mouth breathers may not posture their lips apart at rest for the duration of your cursory assessment. Hence there are a number of other possible signs of a mouth breathing habit:

- Venous pooling (darkened circles under the eyes);
- Symptoms of xerostomia (i.e. stringy, viscous saliva and halitosis);
- Demineralisation localised to upper incisor teeth (that are exposed while mouth breathing);
- Plaque accumulation localised to upper incisor teeth (due to desiccation from mouth breathing);
- Chapped lips; and
- History of ENT issues (studies show up to two thirds of patients treated with removal of tonsils and adenoids and rapid palatal expansion can have a recurrence of sleep apnoea and significant reduction in posterior airway space within 4 years).7

In the absence of overt signs of mouth breathing during a regular dental check-up, it is prudent to conduct the Nasal Breathing Test (NBT). This serves as a screening tool for potential Upper Airway Resistance Syndrome (UARS).

**Steps for Nasal Breathing Test**

- Ask the patient to stand up, place lips together and breathe in and out 10 times (1 breath = 1 inhalation and 1 exhalation);
- Observe for any signs of laboured, thoracic breathing, such as heaving shoulders and chest;
- Listen for any sounds characteristic of nasal resistance;
- You should not be able to see or hear the patient breathe; and
- Record the time taken for completion of the 10 breaths; <50 seconds may be a sign of compromised breathing function.

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Figure 2. CBCT demonstration of the relationship between airway, tongue posture and malocclusion (Iwasaki et al, AJODO 2017) - A: Class II subject had nasal obstruction (upper figure), enlarged tonsils (yellow arrow), low tongue posture (red arrow) and low hyoid bone (light blue arrow); B: Class III subject had no nasal obstruction, but tongue was lowered and postured forwards due to enlarged tonsils (yellow arrow); and C: Class III subject had no nasal obstruction and small tonsils, but still inferior and forwards tongue resting posture has led to the malocclusion.

Figure 3. Breathing Assessment flow chart for a general dental check-up.
The flow chart in Figure 3 depicts a simple breathing assessment screening process that can be included in a regular dental check-up.

Research has also proven the direct link between tongue posture and Class III malocclusion. Primozić et al (1993) compared 3D models and lateral cephalograms of Class I and III patients. A volumetric analysis of the 3D models showed a clear association between low tongue posture (from the cephalograms), significantly narrower smaller palates and significantly larger mandibular intermolar widths in the Class III group.

The tenor of the research is thus showing that treating the breathing and muscular causes of Class III malocclusions is essential in long-term stability.

**Case A - Primary Dentition**

A case in point is this 5yr 6m male, treated with the Myobrace® Interceptive Class III range, together with Myolay™ (composite build ups lower primary molars) (Figure 4). Retraining the breathing and muscular causes established a Class I incisal relationship in less than 2 years. However, even more striking is the long-term result that not only shows better craniofacial development, but also an increased posterior airway space (PAS) in the lateral cephalograms.

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Figure 4a. Left and middle; Correction of the anterior crossbite in 22 months using the Myobrace® Interceptive Class III range and Myolay. Right; Long-term stability of the result is likely due to correction of causative mouth breathing and muscular causes.

Figure 4b. Increase in Posterior Airway Space (PAS).
**Case B – Mixed Dentition**

This 8yr 4m old male presented with a concave profile and severe anterior crossbite (Figure 5). His mother was an experienced dental assistant who was keen on interceptive treatment to prevent the prospect of camouflage therapy and orthognathic surgery. He was again treated with the Myobrace® Interceptive Class III range and Myolay™. However, he also required sagittal maxillary expansion with the Farrell Bent Wire System™ (BWS™). Again, the 12-month progress photo shows good correction, however, the long-term stability at 5 years is especially interesting.

The American Association of Orthodontists advises “there are some things that cannot be accomplished once the face and jaws are no longer growing”. It is therefore proving increasingly obvious that the general dentist is best placed to conduct an early breathing and myofunctional assessment as part of a regular dental check-up for both prevention and treatment of all types of malocclusion.

**About the authors**

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**References**