AIRWAY FOCUSED ORTHODONTICS IN CHILDREN

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he earlier we diagnose and treat airway problems in children the greater the mental and physical health benefits the child will have for the rest of their lives. Your total body health depends on your ability to breathe well. The better you can breathe through your nose the healthier you are. Any airway obstruction of the mouth, jaw, nasal passages, tongue or throat in turn leads to breathing difficulties including mouth breathing, snoring, sleep apnea, hypopnea and upper airway resistance syndrome. Research into airway obstruction in children reports an increased incidence of behavioral problems and learning disabilities in children.¹ Other symptoms of ADHD include hyperactivity, aggressive behavior, lack of focus, anxiety, lack of social skills, bedwetting, depression and brain damage.2,3,4,5,6 Their breathing disorders also affect the emotional and psychological health of the child as well as increased rate of obesity, diabetes and cardiovascular disease.^{7,8,9} Due to all the adverse effects of airway obstruction in children as referenced above, it is imperative that general dentists and specialists learn to diagnose and treat these children so they can live a normal life.

CAUSES OF AIRWAY OBSTRUCTION

- I. Narrow V-Shaped Arches
- 2. Oral Anatomy
- 3. Receding Lower Jaw
- 4. Enlarged Tonsils and Adenoids
- 5. Tongue-ties
- 6. Extractions
- 7. Open Bite
- 8. Bruxism
- 9. Deep Overbites

1. Narrow V-Shaped Arches

Ideally a child's jaw should be U-shaped, not V-shaped. V-shaped arches create a high narrow palate which often causes a deviated septum and obstructs the nasal airway and encourages mouth breathing. Narrow V-shaped arches also cause malocclusions including crooked permanent teeth. When the lower arch is too narrow this does not allow enough room for the tongue. Frequently the tongue has scalloping. (70% chances of obstructive sleep apnea, OSA). A narrow lower arch forces the tongue to assume a backward position in the mouth which increases the incidence of



CONSTRICTED ARCH NO ROOM FOR TONGUE BLOCKS AIRWAY



ARCH EXPANDED ROOM FOR TONGUE OPENS AIRWAY



OSA. It is important not to extract permanent teeth which can also constrict the arches and cause tongue retraction to obstruct the airway.

The other serious problem that occurs with mouth breathing causing a narrow V-shaped arch is that the mandible retrudes so the posterior teeth can occlude properly which is the main etiological factor in the cause of the Class II Skeletal malocclusion. This Class Il Skeletal malocclusion frequently presents with a normally positioned maxilla and an underdeveloped mandible. This causes two serious problems for the patient. The first one is that when the mandible retrudes, the tongue retrudes and further obstructs the airway and often causes snoring, obstructive sleep apnea or upper airway resistance syndrome, all of which are negative for the child. The second reason is that when the mandible becomes retruded, this frequently causes the condyles to be posteriorly displaced which then can cause temporomandibular joint dysfunction (TMD) with numerous symptoms including headaches, earaches, dizziness, congestion and ringing in the ear, back and neck pain. To help diagnose a constricted V-shaped arch I recommend using a cotton roll placed



between the two upper permanent molars on the lingual. In permanent dentition this measurement

between the two upper permanent molars on the lingual. In permanent dentition this measurement should be 36-39 mm. The width of the cotton roll is 37 mm. Girls finish growing at approximately age 15; boys finish approximately age 17.

Nasal breathers will have a normal swallow pattern where the tongue goes to the roof of the mouth during swallowing and will increase the size of the maxilla approximately 1/2 mm per year. Therefore, measure the distance between the upper first molars in millimeters. As an example, if the patient is age 10, female, she will grow another 5 years and therefore the maxilla will increase approximately 2 1/2 mm. This will help you decide whether or not you need to increase the width of the upper arch to make room for all the permanent teeth and also create adequate space for the tongue to function normally. You will have to think much differently if the child is a mouth breather as the tongue will not expand the maxilla during swallowing as the tongue drops down to the lower arch. Mouth breathers will almost routinely require maxillary arch expansion to make room for the permanent teeth. Another clinical tip is that you should expand the upper

and lower arches with removable or fixed appliances until there is adequate space for the permanent upper and lower lateral and central incisors.

The expansion of the maxilla is one of the most important treatments that a child can receive in preventing future sleep-disordered breathing problems such as mouth breathing, snoring and obstructive sleep apnea. When the maxilla is expanded the nasal airway is increased transversely.¹⁰ When the maxilla is expanded the palate drops which increases the nasal

NARROW ARCH NO ROOM FOR LATERALS



ARCH EXPANDED



NARROW UPPER ARCH



airway vertically. The roof of the mouth (palate) is the floor of the nose so arch expansion is the key to success. The objective is to try and convert the child from being a mouth breather to being a nasal breather.

Constricted Upper Arch

Mouthbreathing and extractions causes collapse of upper and lower arches. Treatment: Expansion appliances to widen the arches to make room for all the permanent teeth and open the nasal airway to encourage nasal breathing.





EXPANDED ARCH OPEN NASAL AIRWAY



2. Oral Anatomy

Anatomical structures in the mouth that can cause airway obstruction:

• Large Uvula occluding the airway



• Enlarged tongue covering the occlusal surfaces of the teeth

ENLARGED TONGUE COVERING OCCLUSAL SUPFACES OF TEETH



• Scalloped tongue (70% chances of OSA (Obstructive Sleep Apnea))



Small airway due to low soft palatal drape

SMALL AIRWAY



• Mandibular tori causes tongue to go back and obstructs the airway



3. Receding Lower Jaw Case #1 Female, Age 9 Class II Skeletal malocclusion Normally positioned maxilla

Retruded lower jaw

Chief concern: Migraine (TMJ) headaches Time off from school due to pain.

Treatment

Twin Block Removable functional appliance. Moved lower jaw forward, 7 months. Eliminated migraine (TMJ) headaches. Prevents snoring and sleep apnea by opening the airway. Moving lower jaw forward 6 mm. Increasing the vertical dimension by correcting the 5 mm overbite by extruding the lower posterior teeth.

Both increased the size of the airway.

RETROGNATHIC PROFILE



Posteriorly displaced condyle compressing nerves distal to condyle. Condyle down and forward; increased space distal to condyle for nerves and blood vessels. Headaches eliminated.



OVERJET 6 mm OVERBITE 5 mm

TWIN BLOCK ERUPT FIRST MOLAR HEADACHES ELIMINATED

OVERJET 6mm

TWIN BLOCK ERUPT FIRST MOLAR





POSTERIORLY DISPLACED CONDYLE ANTERIOR DISPLACED DISC

CONDYLE DOWNWARD FORWARD AFTER TREATMENT



OVERJET 6mm OVERBITE 5mm CLASS I CUSPID NORMAL OVERJET



Problem with mouth breathing

It is normal to breathe through your nose, not your mouth. When the child breathes through the nose, with the teeth slightly apart, the tongue should be resting on the roof of the mouth. Then during a normal swallow the tongue presses on the maxillary arch and expands it approximately 2,000 times per day. When the patient is a mouth breather the tongue sits lower in the mandibular arch and does not expand the maxilla during swallowing. Mouth breathing and retruded mandibles often lead to forward head posture which can cause neck pain.

To check for proper head posture look at the position of the head from the side in relation to the shoulder. The back of the ear should be aligned with the middle of the shoulder. For every one inch the ear is ahead results in 10 pounds of pressure on the cervical muscles. Four inches equals 40 pounds which can be very uncomfortable for children. The solution would be to expand the maxilla with a functional appliance and then advance the mandible to its correct Class I molar relationship with a functional appliance.

RETROGNATHIC PROFILE STRAIGHT PROFILE





HEADACHES

HAPPY PATIENT NO HEADACHES



TWIN BLOCK





BEFORE

AFTER

Pretreatment Class II Skeletal malocclusion Forward head posture Neck problems After Treatment Mandible came forward using the Twin Block Appliance in 7 months. Head uprighted over the cervical spine. Eliminated neck pain.