EDUZONE: International Peer Reviewed/Refereed Multidisciplinary Journal (EIPRMJ), ISSN: 2319-5045
Volume 12, Issue 1, January-June, 2023, Available online at: www.eduzonejournal.com

Adenoid Facies - Can Orthodontists Help?

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ABSTRACT

Moss' functional matrix theory was founded on the idea that healthy nasal breathing promotes the growth and development of craniofacial structures by favouring their harmonious interaction with mastication, swallowing, and other parts of the head and neck region. Mouth breathing results from airway blockage brought on by adenoid enlargement. This causes postural alterations such an open mouth, a lowered tongue position, a clockwise rotation of the mandible, and altered head posture. Early intervention necessitates a multidisciplinary strategy for patient assessment, case identification, and therapy. To effectively treat young patients with increased nasal airway resistance, doctors, allergists, otorhinolaryngologists and orthodontists must collaborate. After diagnosis, environmental and inherited factors must be taken into account, but the main objective is to support healthy nasal respiration during a child's early years of facial development. The orthodontist can accurately diagnose and treat these situations using the range of treatment options at his disposal. Although these situations might not be life threatening, they can nonetheless cause a lot of psychosocial issues in later life.

INTRODUCTION

It is widely believed that nasorespiratory function can have a significant impact on how the dentofacial complex develops. It has been specifically claimed that persistent nasal blockage induces mouth breathing, which affects the postures of the tongue and mandible. The development of the "adenoid facies" (dentofacial morphology) follows if this happens during a time of active growth.

Nasal breathing is necessary for the normal growth and development of the craniofacial and dentofacial complexes, in accordance with Moss' functional matrix theory. This theory is founded on the idea that healthy nasal breathing promotes the growth and development of craniofacial structures by favouring their harmonious interaction with mastication, swallowing, and other parts of the head and neck region.

Nasal trauma, congenital nasal abnormalities, hypertrophied adenoids and tonsils, chronic and allergic rhinitis, foreign bodies, polyps, and tumours are some of the potential reasons of nasal blockage, which conditions mouth breathing.

The primary traits of the respiratory obstruction syndrome, according to Ricketts (1968), are the presence of hypertrophied tonsils or adenoids, mouth breathing, an open or cross bite, and narrow external nares.(1).

The posterior nasopharyngeal airway contains the lymphatic tissue mass known as the adenoid. It frequently first emerges in early infancy between the ages of 6 and 10 and then vanishes by the time a person reaches 16. The most common cause of nasal obstruction in children is a condition known as adenoid hypertrophy, which is characterised by a pathological expansion of the nasopharyngeal tonsils. This condition is also linked to the "adenoid face" morphology, which includes a short maxillary arch, posterior crossbite, retrognathic jaw, and a large facial height.

A vertically long lower third of the face height, narrow alar bases, lip incompetence, a long and narrow maxillary arch, and a larger than usual mandibular plane angle is all characteristics of these people. Restrictive nasal respiratory function has frequently been linked to these dentofacial characteristics.(2) Environmental influences are thought to affect dentofacial morphology in a variety of ways, depending on their size, duration, and timing of occurrence.

C. V. Tomes noted in 1872 that toddlers who mouth breathes often acquire a V-shaped maxillary arch. Angle said in 1907 that mouth breathing brought on by blockage of the upper airways always follows and worsens or even conditions Angle's II class I division malocclusion.(3).

This, according to several writers, is a result of mouth breathers' oral airstreams impeding natural downward palatal development. Others thought that mouth breathers' increased negative air pressure difference between their nasal and oral passageways caused them to acquire a deep palatal vault.(4)

According to a second view, oral respiration interferes with the muscle stresses the tongue, cheeks, and lips exert on the maxillary arch. The tongue was thought to be positioned farther forward and lower in the oral cavity in mouth

breathers, preventing it from exerting enough buccal pressure to offset the inward forces exerted by the lips and cheeks on the maxilla. There is recent literature that supports this theory.(5)

A third school of thinking disputes the existence of any connection at all between facial shape and respiratory pattern. One of the first to recognise the V-shaped maxillary arch and deep palate as a congenital characteristic unrelated to mouth breathing was "Kingsley."

According to Linder-Aronson's (1993) theory, enlarged adenoids worsen nose breathing, which throws off the equilibrium of the lingual, labial, and cheek muscles. This causes the alterations that are evident in malocclusion and tooth position anomalies. The researcher described above came to the conclusion that adenoids play a role in the development of skeletal and dentoalveolar abnormalities.

Animals were experimentally given nasal obstruction that led to mouth breathing, maxillary constriction, reduced mandibular position, increased anterior face height, malocclusion, and dental malformations (6).

The existence of a link between mouth breathing and the frequency of malocclusion has not been demonstrated by some investigators. According to Leech (1958), mouth breathing has no effect on the anatomy of the dentofacial region. (7). Since there are so many competing theories, it is still unclear how nasorespiratory function and dent facial shapes are related.

Nasorespiratory function and dent facial development does not have a straightforward cause-and-effect relationship; rather, there is a complicated interaction between inherited and environmental factors.

DIAGNOSIS

Clinical Examination:

Mouth breathing results from airway blockage brought on by adenoid enlargement. This causes postural alterations such an open mouth, a lowered tongue position, a clockwise rotation of the mandible, and altered head posture.

These changes are viewed as:

a. Modified mandibular posture: The mandible rotates backward and downward in response to the causative cause.
b. Modified tongue posture: The tongue moves superiorly and anteriorly in response to the causative cause.
c. Extended head posture: The mandible, maxilla, and skull are maintained in their upward rotation.
d. These changes are made to keep the airway stable.

Other typical characteristics to consider are:

- Dennie's lines are horizontal wrinkles that can be found under both lower eyelids. The American physician Charlies Dennie initially identified them.
- A nasal pleat is a horizontal furrow created by the repeated wiping of nasal secretions upward, immediately above the tip of the nose.
- Bilateral shadows under the eyes caused by persistent venous congestion are known as allergic shiners. The "allergic salute" is another term for wiping nasal secretions upward with the palm or back of the hands.
- Cowden syndrome may include adenoid facies. (5)

It is also possible to undertake a clinical evaluation of nasal and nasopharyngeal disorders. Simple clinical tests, observation of mirror dewing at the external nares, and observation of whether airflow moves cotton wool fibres only allow for the verification of whether the individual breathes through their nose or their mouth.

Physical examination, however, may not always reveal enlarged adenoids. A useful tool for determining the size of adenoids in children with upper airway blockages is a lateral cephalometric radiograph of the nasopharynx.

Radiographic Analysis

The ratio of adenoid width to nasopharyngeal width (AN ratio), which may be assessed on this image, is one way to check for the likelihood of adenoid hypertrophy. This ratio enables the doctor to determine whether or not the adenoid is pathologically enlarged. If determined to be pathologically swollen, the patient is usually given a more thorough otorhinolaryngology follow-up for a conclusive diagnosis and may consent to surgery for an adenoidectomy. To avoid any associated craniofacial effects, dentists should place a high priority on the idea of an accurate early screen for

adenoid hypertrophy. Dentists must label landmarks on the cephalogram in order to determine the AN ratio when evaluating children with suspected adenoid hypertrophy based on lateral cephalograms, which is laborious, time-consuming, and difficult.

The fact that the airway's 3 dimensional (3D) structure is depicted on a cephalogram as a 2 dimensional (2D) image is another significant disadvantage of employing lateral cephalograms for airway study. As a result, CBCT is necessary for additional detection and volumetric assessment of the precise soft tissue architecture in order to perform 3D analysis of the airway shape and potential airway obstruction.

Definitive Diagnosis

Nasal fibrotic endoscopy is the gold standard technique for adenoid hypertrophy diagnosis.(8) (9) Rhinomanometry can also be used to measure the adenoids' size and the nasopharyngeal space. It is the fastest, most accurate, and fixed non-invasive method for the quantitative measurement of nasal blockage. It assesses airflow pressure and nasal resistance.

Although it can offer vital diagnostic information, screening in dental clinics is not appropriate because it is more expensive and time-consuming than an X-ray examination. Numerous research investigations demonstrated the great accuracy of cephalometric radiography in identifying adenoid enlargement.

TREATMENT OPTIONS

Prescription Drug Management

A course of an antibiotic such clindamycin or augment in, which works against beta-lactamase generating organisms, is the first step in the pharmaceutical management of adenoid or tonsillar hyperplasia. Patients who are resistant to the aforementioned medications can be given an antibiotic that is effective against anaerobes and organisms that produce beta-lactamases.

Homoeopathic Therapy:

Homoeopathic treatments include Hydrastis and glycerine, one part of the tincture to six of the liquid; the drops are inserted deeply into each nostril while the child is breathing deeply; they are then left in for around fifteen minutes and flushed out. A weekly injection of tuberculin or, preferable, bacillin can substantially aid and frequently permanently cure adenoids.

Surgical Procedure:

It is necessary to have an adenoidectomy, either with or without tonsillectomy, if hypertrophied adenoids are the source of upper airway blockage. Adenoid should always be removed in conjunction with tonsillectomy since it has the potential to undergo compensatory hypertrophy after tonsil removal. Although comprehensive septoplasty is not recommended for developing faces, conservative septal surgery in patients with growing faces won't have any negative effects on dentofacial growth.

Indications for Aden Tonsillectomy

The indications for adenotonsillectomy have become generally more restricted as a conservative attitude has been developing with regard to this surgical procedure which in the past has been controversial. They are:

1. Persistent or recurring tonsillar infection
2. Hypertrophy of the tonsil and adenoid to the extent of obstruction to the Eustachian tubes and/ or nasal or oral airways. (10)

ORTHODONTIC MANAGEMENT

Interceptive Treatment

Throughout puberty, the jaws continue to expand vertically. Because interceptive treatment may assist avoid complex therapy in the future, it is crucial to detect the issue of anterior open bite at an early stage. With the use of intraoral or extraoral forces, orthodontic tools can slow down or re-direct bone growth in the vertical direction, extrude front teeth, or prevent dental eruption altogether.

Maxillary Expansion

Increased nasal volume and nasal flow as a result of maxilla expansion lessen upper airway blockage symptoms. There are four ways to widen a narrow maxilla:
1. Rapid maxillary expansion (RME), in which a hyrax screw or palate distractor is utilised,
2. Orthodontic maxillary expansion using an approach like the quad-helix appliance
3. Transverse segmental osteotomy
4. Surgically assisted orthodontic maxillary expansion.(11)

Mandibles Repositioning Devices (MRDS)

The removal of the tonsils and adenoids is the most popular treatment for obstructive sleep apnea. Surgical hazards are frequently linked to this surgery. This is why oral orthodontic tools, including mandibular advancement devices, are utilised to advance the mandible and widen the upper airway, preventing its collapse.(12)

Vertical Holding Appliance

The vertical holding appliance (VHA) is an acrylic-paded modified transpalatal arch. The vertical dentoalveolar development of the maxillary permanent first molars is slowed down by the VHA via tongue pressure. According to certain researches, the VHA is helpful in limiting and aiding in the reduction of the proportion of lower anterior facial height in patients who are growing.

High-Pull Headgear

Researchers have looked into how distinct pulls from extraoral forces affect the teeth, as well as the palatal and occlusal planes. Their findings imply that high-pull headgear decreases upper molars' vertical eruption. A similar modification to the dentoalveolus reduces clockwise rotation and, in rare circumstances, causes the mandible to rotate anticlockwise. In patients with Class II division 1 malocclusion and maxillary dentoalveolar protrusion, Caldwell et al. demonstrated that the use of acrylic splints in conjunction with high-pull headgear led to superior and distal displacement of the maxilla, a decrease in the SNA angle, a clockwise rotation of the palatal plane, and a relative intrusion of the upper molars.(13)(14).

Fränkel IV regulator

Thirty patients with a hyperdivergent skeletal pattern, a wide interglacial distance, and postural weakness of the orofacial muscles were examined with the Fränkel IV regulator by Fränkel and Fränkel; the comparison group included eleven patients with an untreated open bite. According to Fränkel & Fränkel, lip-seal training may have altered the vertical components, with the function regulator serving as an exercise tool and promoting postural equilibrium between the muscles that rotate forward and backward.

Camouflage Treatment of Anterior Open Bite

Fixed appliances that generate dental movements while maintaining the same skeletal profile and characteristics can treat some mild cases of open bite. Extractions, the use of elastics, or the placement of mini-implants or miniplates are all possible forms of treatment.

Extractions

The draw-bridge effect, which lessens the propensity of both upper and lower incisors to produce overbite, has led many doctors to approve the extraction of the first premolars in the therapy of skeletal open bite. Alternately, molars can be removed, which is intended to do rid of the wedge that caused the bite to open. However, several studies have revealed that extraction therapy, which is typically used for individuals with open bites who have supra-erupted lower molars, does not improve the lower facial height or proportion of these patients.(15, 16)

Multiloop Edgewise Archwire (MEAW) Technique

Open bites can frequently be fixed with fixed appliance treatment and vertical elastics. The multiloop edgewise archwire (MEAW) technique, which uses vertical elastics and multiloop gable-bend archwires in the canine areas, is one of these methods. The occlusal plane's inclination must be corrected, the maxillary incisors must be placed in proper alignment with the lip line, and the axial inclinations of the posterior teeth must be made upright. The skeleton pattern is barely impacted by the MEAW approach. Changes in treatment are mostly brought about by a dentoalveolar

compensation mechanism, which causes the posterior teeth to shift upright and the anterior teeth to retract and extrude. As a result, the upper and lower occlusal planes move in tandem. As accomplished, anterior teeth extrusion

Mini-Implants and Manipulates

The first description of the use of surgical bone plates in a skeletal anchoring unit dates back to 1985. Later, during the intrusion of the mandibular posterior dentoalveolar segment to repair the anterior open bite, titanium miniplates at the mandibular corpus area were employed as anchorage. In two case reports, the lower molars were intruded by roughly 3-5 mm, greatly enhancing the open bite. The Skeletal Anchorage System, a titanium miniplate, is temporarily implanted in the mandible and/or maxilla as an immovable intraoral anchor, primarily to accomplish significant molar intrusion in the event of anterior open bite. The occlusal plane can alternatively be rotated anticlockwise and the lower incisors can be minimally extruded to achieve the same result. (17,18).

Planned Bilateral Sagittal Split Surgery

This advances the mandible, widens the airway and relieves the symptoms of upper airway obstruction.

DISCUSSION

The amount and size of the adenoids, the patient's growth trend, age, and overall body health all affect the treatment option. Surgery is typically avoided in younger children because it could impede healthy growth. Surgery is frequently performed when there are no other options for treatment. The advantages outweigh the drawbacks. Maxillary arch enlargement is a popular treatment with positive outcomes.(12). Arch expansion is impossible after the suture has ossified. Only surgical enlargement of the arch is currently conceivable. In adults with severe malocclusions, fast palatal expansion is performed surgically aided. This method has undergone thorough research and is secure.

The pharyngeal airway space shortening in elderly patients with sleep apnea makes mandible advancement splints highly helpful. By moving the mandible forward, these splints enhance the pharyngeal airway space, allowing more air to pass through.

All of these therapy options should be employed following a thorough diagnosis of the current issue. Etiological variables are equally crucial, and it is best to identify and address them first. Usually, stenosis of the pharynx or nasal passages causes airway obstruction. This causes mouth breathing, which changes the posture of the body by causing the lips to not seal, the tongue to be depressed, the mandible to rotate backward and downward, and the head to tilt downward. Mastication, deglutition, and phonation are impacted by muscular changes during mouth breathing.

CONCLUSION

Adenoids significantly influence facial expressions, malocclusion, and breathing pattern. As a result, interceptive actions must start right away. Early intervention necessitates a multidisciplinary strategy for patient assessment, case identification, and therapy. To effectively treat young patients with increased nasal airway resistance, doctors, allergists, otorhinolaryngologists, and orthodontists must collaborate. After diagnosis, environmental and inherited factors must be taken into account, but the main objective is to support healthy nasal respiration during a child's early years of facial development. The orthodontist can accurately diagnose and treat these situations using the range of treatment options at his disposal. Although these situations might not be life threatening, they can nonetheless cause a lot of psychosocial issues in later life.

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