**Airway Problems and its Related Disorders**

**An orthodontist Perspective**

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**INTRODUCTION**

Nasal airway patency and malocclusion have long been interrelated.

It is obvious that severe malocclusion must make it difficult for the individual to breathe, chew, swallow, and speak.

The reverse of this could also be true!

Alterations or adaptations in function can be an etiologic factor for malocclusion, by influencing the pattern of growth and development and thereby resulting in malocclusion.

This article attempts to compile the views supporting and opposing nasal obstruction as a cause for malocclusion.

**Mouth breathing**

**Etiology**

a) anatomical-dns, congenital  
b) microgenia  
c) pathological-adenoids, tonsils, Habitual  

“Adenoid Facies”—coined at GUY’S hospital, London, constitutes the following-long face, constricted upper dental arch, exposed upper incisors, receded lower jaw, short upper lip, associated habits

**Obstructive sleep apnea**

**Definition**

Condition caused either by complete occlusion or partial collapse of the upper airway despite the presence of simultaneous respiratory effort. Cessation occurs at the level of nostrils and mouth. Condition is considered pathologic when the episodes last for at least ten seconds and at a frequency of 30 times or more during 7 hrs. of nocturnal sleep in REM and especially in non REM stages of sleep.

**Types**

Central apnea  
Cessation of diaphragmatic excursions

Upper airway apnea  
Obstruction to air flow pass the oropharynx but with persistent diaphragm movements.

Mixed apnea  
Cessation of air flow and absent respiratory effort early in the episode, followed by unsuccessful attempts at respiration later in the episode.

**Role of genioglossus muscle in OSA**

OSA is characterized by recurrent upper airway occlusion during inspiration. The genioglossus muscle is believed to contribute to this. genioglossus muscle activity has been demonstrated in phase with inspiration during sleep.

Preferential activation of this muscle is correlated with pharyngeal opening and resolution of apnea. A dynamic relationship between supraglottic pressure and genioglossus muscle
amplitude has been postulated to explain upper airway occlusion in subjects with OSA.

Effects of OSA
- SYMPTOMS during sleep
- Snoring
- Abnormal motor activity
- Disturbed nocturnal sleep
- Sensation of choking
- Heart burn
- Nocturia
- Heavy sweating

Signs
- Large tongue
- Elongated soft palate
- Reduced pharyngeal length
- Decreased posterior air space
- Increased gonial angle
- Increased upper and lower facial height
- Steep occlusal plane
- Elongated upper and lower incisors

Diagnosis of mouth breathing
Clinical examination
- ask patient to hold water in the mouth
- use double sided mouth mirror or cotton wisps
- facial pattern – long face with incompetent lips not necessary indicate mouth breathing pattern.

Cephalometric analysis
- McNAMARA airway analysis upper,lower
- Upper pharyngeal width – the point on posterior outline on soft palate to closest point on pharyngeal wall – 15 to 20 mm in width.values 2mm or less indicate airway impairment
- Lower pharyngeal width from point of intersection of posterior border of tongue and inferior border of mandible to the closest point on posterior pharyngeal wall – 11 to 14mm usually values are high due to anteriorly positioned tongue as the adenoids are enlarged.

Other cephalometric findings
- vertical growth pattern
- increased ANB
- increased gonial angle
- decreased mandibular length
- steep MP angle
- over erupted upper posterior Segments

Diagnosis
- Is by polysomnography
- Measurements are made to assess sleep stages of breathing and gas exchange to detect sleep stages.
- PSG ensures the no. of apnic episodes per hour of sleep expressed by respiratory (Disturbance Index) measurements of chest and abdominal efforts and oxygen saturation.
- Airway measurement by cephalometric 3D imaging – lateral pharyngeal dimension.

Treatment
Medical
- Weight loss is beneficial
- Nasal vaso constriction sprays
- Withdrawal of respiratory depressing alcohol (antihistamines and tranquilizers)

Surgical
- Uvulo palato pharyngoplasty
- Tracheostomy
- Expansion hyoid plasty
- Mandibular advancement
- Sectioning of hyoid

Other diagnostic tests
- SPIROMETRY
- OXIMETER- to evaluate oxy-Hb level
- RHINOMANOMETRY-instrument used to measure nasal patency
STEDMAN’S medical dictionary defines it as “study of nasal obstruction and nasal airflow characteristics.

PNEUMOTACHOGRAPH - device consisting of flow meter, pressure measuring manifold, and a recording instrument.

RESPIROMETRY - study of both nasal and oral respiratory function.

SNORT – simultaneous nasal and oral respiratory technique.

Effects of airway obstructions

Head posture changes
Beni Solow and Antje Tallgren

Extension of the head in relation to the cervical column was found in connection to large anterior facial height and small posterior facial height, small anterio-posterior dimension, large mandibular inclination to anterior cranial base & to nasal plane, facial retrognathism, large cranial base angle and small nasopharyngeal space.

Ricketts (1968)

Reported subjects with enlarged adenoid with extension of head & forward and downwardly positioned tongue.

NINIMA & COLE

Noted 5 degree increase in cranio facial angle associated with nasal obstruction.

Mandibular rotation

In response to enlarged adenoids which occupy the posterior pharyngeal space the tongue gets anteriorly positioned leading to downward and backward rotation of the mandible. The ANB angle increases, MP angle increases, LAFH increases -Long face syndrome.

Treatment options

Tonsillectomy
Correction of DNS
Adenoidectomy
Nasal polyps
Oral Screen
Rapid Maxillary Expansion
Mandibular Advancement
Hyoid bone repositioning

Surgical

Bi-jaw advancement

REFERENCES

