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Review Article

Oral and Periodontal Sequel of Mouth Breathing

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Abstract

Oral habits are repetitive behaviours learned over time that involve the mouth and can influence the dental occlusion as well as adjacent oral structures. Human beings are typically regarded as nose breathers; however, mouth breathing referred to as chronic oral ventilation, is the prolonged practice of inhaling and exhaling through the mouth rather than nose. This can lead to various consequences including dental disorders, changes in craniofacial development, sleeping issues and airway problems.

Keywords: Mouth Breathing; Gingival Pathosis; Craniofacial; Habit; Dental Disorder

Introduction

Breathing is an essential activity that lend themselves well to experimental analysis [1]. Human beings are considered to be nose breathers however, certain circumstances may compel them to switch to mouth breathing, which can result in significant repercussions [2]. Mouth breathing is categorized into two types based on whether nasal obstruction is present. Mouth breathing that occurs in the absence of nasal obstruction is commonly referred to as habitual mouth breathing. Various factors contribute to mouth breathing associated with nasal obstruction, such as allergic rhinitis, adenoid and tonsil hypertrophy, and nasal septal deviation. An assessment of craniofacial morphology indicated that mouth-breathers exhibited a greater inclination of the mandibular plane to the Frankfort plane and an increased lower-face height, while the mandible was rotated posteriorly when contrasted with nasal breathers [3]. The chances of experiencing adverse effects from any oral habit is associated with four key factors: frequency, intensity, duration and susceptibility. Consequently, the age at which (MB) manifests may suggest an increased risk of alterations in facial growth among children [4].

Definition

According to Chacker's, Nasal breathing difficulties are defined as a prolonged exposition of the frontal facial tissues to the drying up effect of the inhaled air [2].

According to Sassouni, Mouth breathing as a habitual respiration through the mouth instead of the nose. And Merle suggested the term oronasal breathing instead of mouth breathing [5].

Etiology

The causes of mouth breathing are diverse. The most prevalent cause is nasal obstruction. This obstruction can arise from either congenital factors or postnatal conditions and may increase resistance to airflow [2].

Enlarged turbinate

This condition may arise from allergies, chronic infections of the mucous membrane, atrophic rhinitis, hot and dry climatic conditions, or polluted air.

Intranasal defects

These include a deviated nasal septum, subluxation of the septum, increased thickness of the septum, bony spurs, and nasal polyps.

Allergic rhinitis

Ongoing infections and bacterial toxins can sensitize the tissue, leading to the development of allergic reactions.

Hypertrophy of pharyngeal lymphoid tissue (adenoids)

Frequent infections can lead to the excessive growth of lymphoid masses, which obstructs the posterior nares and necessitates mouth breathing [2].

Enlarged conchae due to allergies, chronic infections of mucous membrane.

Bad habit to staying mouth opened during sleeping and staying without any medical condition [6].

Clinical features

Patients who habitually breathe through their mouths often exhibit distinct symptoms both inside and outside the mouth1. Habitual mouth breathing can lead to the development of an open bite or contribute to abnormal vertical occlusion. In a study conducted in Nagahama city, Japan, approximately 17% of the population was found to exhibit mouth breathing habits [7].

Effect on face

Long narrow face; narrow nose and nasal passage; flaccid lips with upper lip being short; expressionless face; increased mandibular plane angle; retrognathic maxilla and mandible (Figure 1).

Figure 1: Effect on mouth breathing in face.

Effect on lip

Short thick incompetent upper lip; voluminous curled over lower lip; gummy smile; lips are not together[2]. (Figure 2).

Figure 2: Lip apart swallow.

Effect on gingiva

The gingival tissue in the front upper jaw is inflamed and irritated; classic rolled marginal gingiva; enlarged interdental papilla; the gums are constantly drying out that causes irritated [2].

Speech defects

Voice has a nasal quality or resonance [5].

Dental defects

The upper and lower incisors are angled backward; posterior cross bite; anterior open bite; flaring of incisors; the mandible is positioned distally in relation to the maxilla [2] (Figure 3).

Figure 3: Effects on mouth breathing on teeth.

Gingival pathosis in mouth breathers

Mouth breathing can cause irritations leading to damage in mucous membrane and gingiva considered. This depend on the duration and nature of mouth breathing which can be occasional or continuous. This could cause progressing chronic inflammation and degeneration of gingival tissues if it is untreated for a longer period of time [8].

Effect of mouth breathing on periodontium

Adult mouth breathers with incompetent lip seal had a higher score of gingival inflammation mostly on the upper anterior segment [1].

The effects on periodontium include :

- **Xerostomia and reduced saliva flow:** Mouth breathing (MB) is frequently linked to dry mouth, decreased saliva production, and a heightened risk of periodontitis. This dry environment favors the growth of periodontopathic bacteria, which are known to contribute to gum disease.
- **Periodontal disease:** Especially during the night, MB is closely associated with the deterioration of periodontal health and the onset of periodontitis, with around 55% to 75% of individuals who chronically breathe through their mouths suffering from gingivitis or periodontitis [9].
- **Increased bacterial colonisation:** Dry mouth symptoms caused by prolonged oral breathing are common in patients with SDB, which leads to greater bacterial colonization and accumulation, as well as increased risk of periodontal diseases [10].

The impact of mouth breathing on malocclusion

Mouth breathing which impact occlusion, arch form, and different dental morphologies. Firstly the tongue's abnormal position away from the hard palate allows excessive cheek pressure to influence the upper molars, causing them to tilt inward, this leads to constriction of the upper arch, posterior crossbite, high vaulted palate[7]. Research found that children aged 7-12 with adenoid hypertrophy blocking nasal breathing were more likely to develop malocclusion, this issue was particularly prevalent in boys with adenoid hypertrophy compared to children without the condition who breathed normally through their nose [11]. Based on gender and Angle class II, division 1 is more common than class 1 malocclusion in mouth breathers [12]. A study found that enlarged tonsils in children around age 6 increased the risk of large overjet and class II malocclusion [13]. A research showed that allergic rhinitis causing nasal obstruction, significantly increases the risk of developing malocclusions [14].

The impact of mouth breathing on maxillofacial development

Mouth breathing causes adaptive changes in the lip, tongue, and mandible which in turn influence skeletal alterations through neuromuscular responses, resulting in the maxillofacial morphological changes [15].

Cephalometric data in children and adolescents with nasal and oral breathing were compared in a systematic review if 19 studies, there was evidence that mouth breathers have more retrognathic maxilla and mandible as well as a greater angle of mandibular plane and a downward and backward rotation of the mandible, despite the low quality of the included studies [16].

The impact of mouth breathing on dentofacial health

Mouth breathing causes saliva evaporation, reducing oral humidity. Key risk factors for oral issues in asthmatic children included; acidic pH, dental caries, anterior open bite, gingivitis, atypical swallowing, and high arched palate [17]. 150 of the parents of the 170 kids with mouth breathing and adenotonsillar hypertrophy consented to take part in the study, 77 of the children were male and the risk factors are, among the children 101 had cavitated dental caries, had initial moderate and advanced caries and 89.3% had gingivitis [18]. A study examined mouth breathing children aged 3-5 years with primary teeth, assessed that dental caries prevalence, gingivitis, mutans Streptococci levels in saliva and plaque indices [19]. Allergic rhinitis and mouth breathing may negatively impact oral health, potentially leading to; increased tooth loss, more dental fillings, higher risk of dental caries [20].

Diagnosis

An early diagnosis is crucial for correcting mouth breathing and preventing any related conditions. The key step in diagnosing mouth breathing is to accurately document a comprehensive case history. Along with this proper clinical examination of extraordinary and intraoral will result in easy diagnosis of the disorder.

A few diagnostic tests are performed to confirm the diagnosis:

- **Mirror test:** It is also called as fog test. A double sided mirror is held between the nose and the mouth. Fogging on the nasal side of the mirror indicates nasal breathing while fogging on the oral side suggests mouth breathing.
- **Massler's water holding test:** Patient is asked to hold the mouth full of water. Mouth breathers cannot retain the water for a long time.
- The Massler and Zwemer butterfly test, also known as the cotton test, involves placing butterfly-shaped cotton strands over the upper lip, just below the nostrils. When the patient exhales, if the fibers move downwards, it indicates that the patient breathes through the nose; conversely, if the fibers move upwards, it suggests that the patient breathes through the mouth.
- **Inductive plethysmography (rhinometry):** The total airflow through the nose and mouth is quantified, the only reliable way. This allows the percentage of nasal and oral respiration to be calculated.
- **Cephalometrics:** This helps to calculate amount of nasopharyngeal space, size of adenoids and to study the skeletal patterns of the patient by taking various cephalometric angles [2].

Management

Treating these kind of habits involves; patient/parent counselling, behaviour modifications, myofunctional therapy, appliance therapy [21].

Symptomatic treatment

Interception of the habit; If the behaviour persists even after the obstruction has been removed, it needs to be changed. Physical exercises, lip exercises, and oral screening can be used to correct.

Oral screen

The best method for re-establishing nasal breathing is to keep air out of the mouth. The material used to construct the oral screen should be compatible with the oral tissues (Figure 4).

Preorthodontic trainer

It is used in mouth breathers, tongue thruster and thumb suckers [5].

Figure 4: Effects on mouth breathing on teeth.

Mouth closure devices/tape

Both short-term and long-term solutions like straps, tape, or specific appliances are promote lip closure and nasal breathing.

Multidisciplinary approach

Recognizing the complexity of mouth breathing, a collaborative approach involving paediatricians, dentists, orthodontists, and ear nose and throat (ENT) specialist is emphasized for comprehensive diagnosis and treatment planning.

Conclusion

Mouth breathing may seem harmless, but its effects on oral health can be far reaching. From dry mouth and bad breath to gum disease and orthodontic problems, chronic mouth breathing can lead to numerous dental issues. Recognizing the problem and seeking appropriate care can help improve oral health and overall quality of life. In order to prevent the ensuing disorders of chronic mouth breathing, a multidisciplinary team should collaborate to provide an early diagnosis and suitable treatment plan.

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