Airway Interference Syndrome

Clinical Identification and Evaluation of Nose Breathing Capabilities

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A practical clinical approach to identifying and evaluating nose breathing capabilities in orthodontic practice.

Nasal breathing is the primary mode of air intake for the human, and it is essential for a supply of properly cleansed, moistened and warmed air for the lungs. The mouth is only a secondary emergency orifice for assuring an uninterrupted supply of air, and using it on a regular basis can cause many serious problems.

Mouth breathing in the human is not a habit. It is an unnatural act of necessity to get air into the lungs when the primary airway is blocked by nasal, nasopharyngeal or lower pharyngeal obstruction. It may be continuous or intermittent.

Mouth breathing introduces cold, dry unprepared air that insults the tissues of the oral cavity, nasopharynx and lungs, leading in turn to pathological changes in oronasal, nasopharyngeal and other respiratory tissues.

The ability to breathe effectively through both right and left nasal cavities without effort in both upright and reclining positions is also essential to normal muscular balance

in the face, jaws and dentition. Pressures and tensions of soft tissues can influence the shape or morphology of bone.

Longitudinal and cross-sectional clinical human studies and controlled animal studies have shown conclusive evidence that the functional imbalance of the muscles of the face and jaws caused by the lack of nasal breathing capability, with persistent intermittent or continuous mouth breathing, can cause deformities throughout the dentofacial complex (1-38).

Recognition of the symptoms of airway obstruction is an important consideration in dentofacial orthopedic diagnosis. Some symptoms may be subtle and somewhat removed from the primary dental focus of such a diagnosis, so the following descriptive outline can be a useful diagnostic guide.

The full range of symptoms may not be present in every case, but enough are usually present to provide useful diagnostic indicators for the identification and further evaluation of this syndrome.

Clinical Testing

The concern in clinical evaluation of airway interference is not necessarily how many grams, ounces, pounds or cm/H_2O/liter per second of air can be expired through the nose; it is whether or not the individual can comfortably *inspire* air through both nasal cavities without effort. Resistance in inspiration is greater in the child than in the adult.

Expiration of air is not important as a cause of mouth breathing. The problem is *interference with inspiration,* and the crucial factor is whether air can be inspired with sufficient ease and freedom from anxiety to make nose breathing the method of choice.

A basic requirement in testing nose breathing capabilities is to determine how well the individual can breathe in a natural environment, which is not necessarily the same as breathing in an experimentally prepared and rehearsed atmosphere.

The method described here for testing nose breathing capabilities for all types of patients is practical, definitive, accurate, expedient, and inexpensive. Supplementary rhinomanometric or other quantifying air flow studies, rhinoscopic examination and radiographic studies may also be used as indicated.

This method has been used with consistent results for 13 years, evaluating approximately 1200 patients with questionable breathing capabilities at intervals of hours, days, weeks, months, and years. Results have been consistent except when trauma or disease has ben experienced between evaluations. Results were not altered by colds, asthmatic symptoms or seasonal allergies.

The need for such an examination is established by a preliminary examination based on an understanding of the *airway interference syndrome* (right) and the effects of airway obstruction on the growth and development of the face, jaws, and dentition.[37,38] A complete orodentofacial examination, which may include oriented lateral and posteroanterior radiographs, a panoramic radiograph,

Airway Interference Syndrome

Facial manifestations

- Puffy upper eyelids
- Underdeveloped infraorbital tissues
- Hypotonia of the maxillary lip (pale and thin)
- Hypertonia of the mandibular lip (red and thick)
- Hypertonia of the mentalis muscle (puckering)
- Anxious or unrelaxed facial expression
- Cracked, chapped, pebbled or wrinkled upper lips
- Cheilosis
- Dried saliva on the lips

Intraoral Manifestations

Soft tissues

- Inflammation and/or hypertrophy of gingivae (including rugae)
- Hyperemia of palatal tissues
- Inflammation of anterior and posterior faucial pillars
- Inflammation of pharyngeal tissues
- Glossitis, scalloping, creasing or fissuring of the tongue

Hard tissues

- Lingual axial inclination of alveolar process and teeth
- Rounding of posterior mandibular alveolar process
- Ribbing or prominence of roots
- Exostosis of alveolar process
- Hypertrophy of tissue at the maxillary tuberosity.

Occlusion

- Anterior and/or posterior open bite
- Lingual axial inclination of teeth
- Depression of teeth
- *These symptoms may be superimposed on any jaw relationship or malocclusion*

Nasopharyngeal manifestations

- Enlarged adenoid and/or tonsillar tissue
- Mouth breathing

Nasal Findings

- Improper anterior liminal valving
- Septum deformity, deviation or kinking
- Spurs or exostoses
- Hypertrophied turbinates
- Polyps or cysts, Allergic and vasomotor rhinitis
- Rhinorrhea
- Foreign bodies

Radiographic Findings

Oriented lateral and anteroposterior radiographs

- Enlarged adenoid or tonsillar tissue
- Polyps and cysts
- Deformities of the septum and turbinates
- Abnormal tongue posture
- Anteroposterior and vertical jaw discrepancies
- Upward and outward posture of the cranium and face in relation to the cervical vertebrae
- Curvature of the cervical spine (lordosis or kyphosis)
- Asymmetries of the mandible
- Narrowing of the maxilla and nasal cavities

Fig. 1 Patient position for breathing test.

oriented dental study casts and photographs is recommended, along with a thorough family and medical history which includes past illnesses, heredity, habits, diet, allergies, surgical operations and geographic environment.[38,53]

Test procedure

The test is conducted prior to any introduction of a vasoconstrictor. It is unrehearsed, with the patient in a reclined position and the examiner preferably in a relaxed, sitting position (Fig. 1). To further validate breathing capabilities, clinical testing and air flow studies should be conducted with the patient in a reclining or sleep position. This is the posture that is assumed for approximately 1/3 of our lifetime, and it is the position in which most symptoms of breathing difficulties, like wheezing, snoring, loud or difficult breathing and drooling are experienced.

Nose breathing capability is first tested by gently closing the lips together with light pressure of thumb and middle fingers for 2 to 5 minutes. It is important that the patient not be informed of the purpose of this act (Fig. 2).

Should the patient stop breathing, become cyanotic or make attempts to open the mouth to breathe, this indicates obstruction of either both nasal cavities or the nasopharynx, and the testing is discontinued.

If the patient can breathe through the nose, even if some difficulty is experienced, the test is continued to dif-

Fig. 2 Gently holding lips closed for nasal competency test.

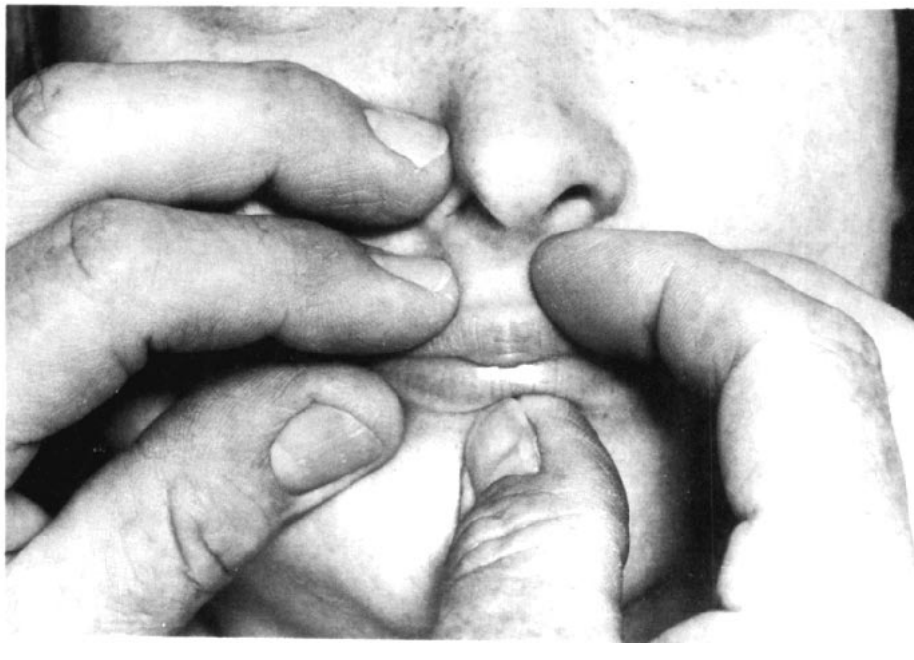

Fig. 3 Blocking one side of the nose to test the opposite side.

Fig. 4 A chin cap to hold the mouth closed as an aid to testing nasal competency.

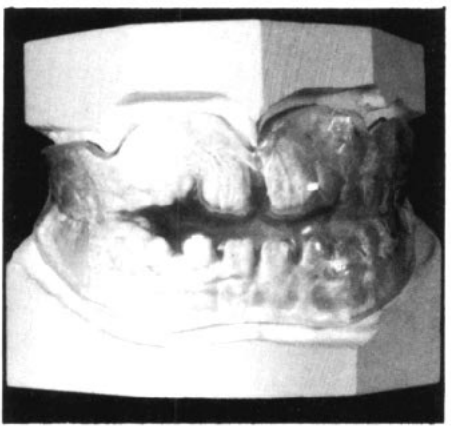

Fig. 5 An oral screen for testing nasal breathing capability.

ferentiate nasal from pharyngeal obstruction.

Without allowing the lips to be parted, the index or middle finger is used to close off one nostril at a time, again for 2-5 minutes (Fig. 3). During this period, the eyes, stomach and chest are observed for changes of expression or exaggerated movement.

After the testing of both nasal cavities, the patient is asked whether one side was easier to breathe through than the other. A difference between the two sides is an indication of nasal obstruction, although this still does not rule out concurrent pharyngeal obstruction. If the patient is unsure, the test should be repeated, because this differentiation is important.

Home testing

If some question still remains whether proper breathing through the nose is possible, the patient is given a diagnostic information sheet[37,53] for completion at home. Either the patient, partner or parents can watch for symptoms of breathing difficulty during eating, sleeping, or other activities.

A chin cap and/or an oral screen can be helpful in evaluating nasal breathing capabilities in the reclining position, wearing it only at night (Figs. 4 and 5). Pressure for the chin cap is not specified in units of force; it need only be tight enough to keep the lips and teeth together. It is permissible for the patient or parent to adjust the tension for comfort. This test can be conducted over a period of two to three weeks. If the chin cap is repeatedly removed by the patient, or if the oral screen is rejected, proper nose breathing is probably not possible.

Air Flow Studies

Air flow studies are recommended where available, but the equipment is complex, experimental, expensive and time consuming; and it cannot

be applied to all subjects because of age, mental, physical or other management problems.[39-52]

The following statements summarize an exhaustive review of the literature combined with the findings of most clinicians and investigators in air flow studies.

"The limitation of rhinomanometry or any test of physiologic function is its inability to diagnose the causes of the functional disturbance. The diagnosis of the cause or the causes of nasal obstruction depends on the integration of adequate history, physical examination (including rhinoscopy), physiologic data, laboratory studies and radiographs when indicated. Rhinomanometry is concluded to be a valuable method for recording, quantifying and substantiating nasal airway obstruction in persons with nasal pathologic conditions."[44]

"Perhaps the greatest application for rhinomanometry or other air flow studies is the study and quest for more knowledge concerning normal and pathological functions. Absolute figures denoting respiratory alterations and quiet respirations are almost impossible to obtain in a system that is dynamic and constantly changing."[40]

Surgical referral

If the test reveals a breathing handicap, the patient is referred to a surgeon for further evaluation, forwarding a description of the examination procedures and findings.

Patients are initially referred to a surgeon because there are many more positive, frequent, identifiable anatomical deformities or anomalies than positive allergies or other general physical problems related to airway interference. Referral is made with the understanding that if a definite anatomical deformity or obstruction is not found, then appropriate allergic, neurologic, pulmonary, cardiac or other evaluation will be requested as indicated.

Conclusion

There is still a real need for new methods for more precisely identifying the causes and sites of airway interference as an aid in deciding which structures should be treated, and how. Meanwhile, the methods presented here can very effectively identify these problems and help to expedite timely and effective care for this debilitating and disfiguring handicap.

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