

## Research Article

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# Clinical Variations of Mouthbreathing

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The possible importance of oral posture during respiration in long term oro-facial growth and function has been suspected for some time. Therefore, the mode of upper respiration was included in the "Oral Myology" screening tests administered to all child patients in the Department of Dentistry for Children, Creighton University School of Dentistry, Omaha, Nebraska. The following is a summary report of the clinical observations of upper respiratory mode in a group of children who were judged to be "non-normal" breathers by the student dentists and speech clinicians administering the oral myology screening tests. Any child who was seen to demonstrate a mode of upper-respiration in which the repose posture of the jaw, tongue, and lips were judged to be non-normal by both of the student examiners was given a failing score on the respiratory mode item, and referred for follow-up evaluation.

## Methods and Materials

A total of 30 children failed a mode of respiration screening test item which required the examiner to judge oral posture during respiration as either "normal" or "abnormal". There were 15 girls and 15 boys in the sample. Follow-up clinical observations were obtained anywhere from one hour to two weeks following the initial screening identification. Upon return to the facility, each subject was examined in the Dental and Speech Sciences Laboratory by a speech pathologist to determine the mode of upper respiration. Observations were made over a two minute period with the subject standing erect, eyes closed. Postures of the mandible, lips and tongue were recorded. When the tongue tip was not visible, the examiner manually everted the lower lip during an extension of the observation period in order to ascertain the relative position of the tongue during respiratory rest. A cool mirror was alternately placed in front of each nostril during exhalation, and the functional patency of the nasal airway verified by the clouding of the mirror's surface. The mirror was employed in like manner to disclose the presence of a functioning oral airway at the lips. Children who demonstrated complete nasal occlusion underwent a second observation after blowing the nose into a tissue until the examiner judged that all excessive nasal mucous had been expelled.

## Results

Table I shows the categories or modes of abnormal upper respiration clinically observed in the final sample of 29 children together with relative incidence within each. Five clinically different sub-categories of abnormal respiration were observed.

Upon return to the laboratory for follow-up, one child demonstrated normal, nasal breathing, with patent airways through both nostrils, the tongue slightly elevated and retracted behind the dental arches, lips closed, and the mandible closed to within approximately one millimeter of static dental occlusion. He was not included in Table I.

A total of seven children, although exclusively nose breathers, were judged to have abnormal, maladaptive open mouth oral postures accompanying breathing (Category A, Table I). The mandible was seen to be carried abnormally low and sometimes forward. The carriage of the tongue was likewise observed to be interdental anteriorly and sometimes laterally, and in one case, the tongue was seen to protrude grossly extraorally onto the vermilion border of the lower lip. In the remaining cases, however, the lingual apex remained within the oral cavity and rested interdentially in the labial sulcus against the posterior mucosal surface of the lower lip. Although the lips were parted to some degree in all seven of these subjects, no respiratory exchange was discernible at the lips. It was noted that the degree to which the mandible was lowered in these subjects differed dramatically between subjects, resulting in a range of oral postures from a slight lip aperture to gaping, cosmetically distracting open mouth oral postures in two of the subjects.



TABLE 1  
Categorization of Upper Respiratory Modes  
Observed in 29 Children Identified  
As Non-Normal Breathers

Category	n =	% of Total	Cumulative %
A. Maladaptive nasal breathing with oral compensations	7	24.15	24.15
B. Simultaneous nasal-oral breathing	14	48.28	72.43
C. True Mouthbreathing:			
Type I-Tissue Occlusion	4	13.79	86.22
Type II-Exudative Occlusion	2	6.89	93.11
Type III-Habitual/functional Occlusion	2	6.89	100.00

The second category (B in Table I) accounted for approximately 48% of the sample and was characterized by simultaneous nasal and oral breathing. Mirror clouding verified respiratory exchange through the oral aperture and one or both nostrils in all of these subjects. Superficially, the oral postures in these subjects generally paralleled those seen in category A, in that a relatively unobtrusive lip aperture was always present and the mandible was abnormally lowered. However, tongue tip placement at rest was more variable in this subgroup. Most often the tongue was lax and rested interdentally against the posterior surface of the lower lip. However, some of these subjects held the tongue in a tense, more retracted and lowered posture with the tip either free behind the dental arches and low in the oral cavity (two subjects), or anchored low behind and against the anterior mandibular dentition (one subject); both of these tongue postures were consistently accompanied by relatively lower, more retracted and open mandibular postures than evidenced by the other eight subjects in this category.

Category C in Table I accounted for the remaining eight subjects, or approximately 27% of the total sample. These individuals had in common the fact that they evidenced no nasal respiratory exchange. Four of these subjects were categorized into "Type I" Tissue-Occlusion" mouthbreathers. Nose blowing proved difficult if not impossible for these children, with very little exudate expelled. Follow-up lateral radiocephalometry verified the presence of large, occlusive adenoid pads in all of these subjects, and intra-oral examination demonstrated short, prematurely impeded velar excursion during elicited gag reflex. Also, speech in these subjects was characterized by denasal resonance in phonetic contexts containing nasal consonants. Two subjects in Category C were characterized as "Type II-Exudative Occlusion" mouthbreathers (i.e., upon blowing the nose a patent nasal airway was easily established, demonstrating that the nasal occlusion impact was due to accumulations of mucous). Following secondary observations, one of these Type II mouthbreathers was reclassified as a Category A maladaptive nasal breather with oral compensation, while the second behaved as a simultaneous nasal-oral breather (Category B).

Finally, two subjects classified in Category C (Type III) demonstrated a myofunctional, habituated form of mouthbreathing characterized by active velopharyngeal closure. Both subjects had patent nasal airways and could function as normal, non-compensated nasal breathers when reminded to do so. However, upon distraction, in true respiratory rest, the velum was raised habitually and total mouthbreathing ensued. The potential patency of the nasal airway and raised velum were verified by lateral radiocephalometry in both subjects. One of these subjects had undergone tonsillectomy-adenoidectomy three years previously, and the other evidenced normal tonsil and adenoid mass. The oral postures of all eight subjects in Category C paralleled those described as being most characteristic of simultaneous nasal-oral breathers (i.e., lax, low, forward interdental tongue posture, open lips, and varying degrees of down and forward rotation of the mandible).

## Discussion

The data in Table I demonstrate conclusively that the traditional research and clinical dichotomy of "normal breather/mouthbreather" is untenable as a method of differentiating normal from non-normal modes of upper respiration. Using only the criterion of oral respiratory exchange, one risks the exclusion of the approximately 24% of non-normal breathers identified in this study as maladaptive nasal breathers with oral compensation (Category A in Table I). Further, this criterion fails to differentially diagnose the several different modes of non-normal breathing involving some form or degree of oral respiration, (i.e., Category B and the three subtypes of Category C in Table I).

Oral postures accompanying maladaptive nasal breathing (Category A, Table I) either paralleled or represented exaggerated equivalents of those seen in the other non-normal breathing subjects. In fact, the most severe maladaptive tongue and jaw postures were seen in this group. Certainly any repercussive symptomatology associated with chronic maladaptive

myofunctional activity would have equal if not greater probability among these subjects as among those traditionally classified as mouthbreathers. Likewise, inclusion of this sub-population of nasal breathers in the supposedly normal nasal breathing populations often used as the pool of control subjects for research purposes offers the possibility for extremely erroneous conclusions when subjects are grouped simplistically as "normal" and "mouthbreathers."

### Summary

Thirty children identified during oral myology screening as "non-normal breathers" underwent clinical observation for the differential assessment of their mode of upper respiration. Procedures and clinical criteria for the successful differentiation of all subjects into four basic categories, including normal breathing and three categories of non-normal breathing, were presented. Implications of the reported findings relative to the traditional clinical and research dichotomy of "normal vs. mouthbreathing" were discussed.

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