Nasal Airway Obstruction and Facial Development

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Historical Background

The subject of this review is the relationship between nasal airway obstruction and facial development. Put another way, the review will explore past and present research into the question of whether an aberrant mode of respiration, i.e., using the mouth to breathe in preference to the nose, causes deviation in facial anatomy. A number of important anatomic relationships which have been the focus of study are described in Figure 1.

The earliest statements on this subject are informed opinions, not critical evaluations. Robert (1843) noted the relationship between a high, narrow palate and obstructed nasal breathing. Meyer (1873) concluded that narrow, high-arched palatal development occurred in individuals with small nasal chambers because the nose failed to develop normally due to obstructive disease.

A dominant theme in the early twentieth century was the immutability of heredity. The role of genetic predisposition in creating an unchangeable facial type took preeminence over any notion that functional relationships might alter form. Grosheints made extensive measurement of skulls and concluded that development of a small, high-arched palate depended in most instances on a "congenital racial characteristic of skull formation and not upon postnatal and acquired conditions such as nasal obstruction." Somewhat later, GynneEvans and Ballard, professors of orthodontics and respiratory diseases, respectively, evaluated the relationship between morphology and breathing conditions over a 15-year period. They concluded that orofacial morphology remained constant during growth regardless of mode of respiration, and that there was no special morphologic type associated with mouth breathing.

Counter to this hereditary determination school, others in the twentieth century reiterated the nineteenth century sentiments of Robert and Meyer. Duke (1926) postulated that nasal allergy produced a specific facial type because of defective aeration of the ethmoid cells and maxillary antra. Bowen (1939) stated that protruding maxillary teeth and retrusive lower jaws were...
due to retardation of sinus development caused by chronic allergy. He claimed that maxillary deformity existed in 24% of allergic children. Other researchers concurred that perennial nasal allergy interfered with facial development.\(^5\)

The infancy of modern clinical research left the issue of hereditary versus functional adaptation unsettled. Straub\(^5\) evaluated the incidence of allergy in 104 patients who came to his clinic for orthodontic treatment. Patients were questioned concerning personal or family history of allergy. Those with positive or possible allergic histories received scratch and intradermal skin tests of common antigens. Forty-one (39.4%) of the group were allergic as determined by history and skin testing. Of those 39 who received orthodontic evaluation, 24 (61%) had a retrusive mandible, a constricted maxillary arch, and protruding maxillary incisors. The incidence of this facial type in allergic patients was strikingly higher than in the nonallergic patients, causing Straub to conclude that allergy and resulting nasal blockage was related to the development of dentofacial anomalies. Straub did not show, however, that his allergic patients actually had nasal blockage through any sort of functional assessment of nasal airflow.

Focusing on mode of breathing, Leech\(^6\) (1958) evaluated 500 patients and