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Primate experiments on oral respiration.

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Oral respiration associated with obstruction of the nasal airway is a common finding among patients seeking orthodontic treatment. The primate experiments reported here are part of a series designed to test some of the current hypotheses regarding the relationship between mouth breathing and dental malocclusions, that is, between deviations in orofacial muscle recruitment and jaw morphogenesis. Mouth-breathing was developed in the animals of this experiment by obstruction of the nasal passages with silicon nose plugs. The experiments showed that the monkeys adapted to nasal obstruction in different ways. In general, the experimental animals maintained an open mouth. Some increased the oral airway rhythmically, while others maintained the mandible in a lower position with or without protruding the tongue. All experimental animals gradually acquired a facial appearance and dental occlusion different from those of the control animals. From these and the previously reported primate experiments in this laboratory, it can be deduced that orthodontic appliances in general affect the morphology of the orofacial structure in two ways: by direct force and by sensory stimulation. (1) The appliance exerts a direct physical force which alters the strain distribution in the bone and elicits bone remodeling and tooth movement. (2) The presence of the appliance initiates the sensory input which triggers a neuromuscular response. This change in neuromuscular activity, in turn, affects both muscle development and bone remodeling. The fixed orthodontic appliance may work mainly on the first principle. Certain removable appliances may have a significant effect based on the second principle.

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