

[Am J Orthod.](#) 1982 Feb;81(2):99-107.[Links](#)

Sequential neuromuscular changes in rhesus monkeys during the initial adaptation to oral respiration.

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Experimental induction of oral respiration in primates altered the neuromuscular use of specific craniofacial muscles. Obstruction of the nasal passage in the rhesus monkey induced changes in the electromyographic discharge (EMG) of both mandibular and facial muscles during the first 6 months of adaptation. Eighteen craniofacial muscles were studied with regard to their type of neuromuscular pattern. The EMG discharge was analyzed in terms of whether it had a rhythmic discharge or a continuous recruitment of motor units. The results of the investigation revealed that certain muscles in the control monkey using nasal respiration could be rhythmically or continuously active, but no significant trend was apparent with either pattern over time. In contrast, a significant number of muscles became rhythmically active within the first month of adaptation to oral respiration in the experimental animals. The rhythmic pattern was evident in key muscles that actively depressed the mandible, protruded the tongue, altered the shape of the tongue, and raised the upper lip. Continuous activity was induced in the first month within the suprahyoid region and tongue but later, by the fifth month, in specific lip and elevator muscles. These results suggested that the neuromuscular system adapted immediately to nasal obstruction but would vary as to (1) which muscles would be important in the initial adaptation, (2) the mode of adaptation, and (3) the time when a particular pattern first began to be used.

PMID: 6960705 [PubMed - indexed for MEDLINE]