

A Physiologic Comparison of Nasal and Oral Positive Airway Pressure*

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Study objectives: The effectiveness of nasal continuous positive airway pressure (CPAP) in treating obstructive sleep apnea (OSA) is based on raising the intramural pressure above a critical collapsing pressure of the oropharyngeal airway. It is currently unclear whether CPAP delivered orally is also capable of raising pressure in the oropharynx above the critical collapse pressure.

Design: We tested a novel oral CPAP device to determine whether the pressure-flow relationships are similar to nasal CPAP and whether the device alters these relationships. Patients were selected based on having moderately severe apnea and were randomized to nasal CPAP, nasal CPAP with oral device, or oral CPAP.

Setting: Johns Hopkins University, The Johns Hopkins Asthma and Allergy Center, Baltimore, MD.

Patients: Five men and two women with OSA were studied.

Interventions: Individual pressure-flow curves were constructed during the application of nasal or oral CPAP.

Results: We found the following: (1) a similar effective pressure eliminated inspiratory flow limitation for the nasal or oral CPAP; (2) as pressure in the nose or mouth was lowered below the effective pressure, a linear pressure-flow curve was obtained and a critical closing pressure was described; (3) similar mean (\pm SD) critical pressures of -0.3 ± 5.3 , 1.7 ± 4.0 , and 0.5 ± 2.8 cm H₂O, respectively, occurred for nasal CPAP, nasal CPAP with the oral device in place, and oral CPAP conditions ($p > 0.1$); and (4) the comparable mean values for upstream resistance were 27.8 ± 19 , 19.1 ± 8.3 , and 26.5 ± 26.7 cm H₂O/L/s, respectively, for the above three conditions ($p > 0.1$).

Conclusions: We concluded that comparable upper airway pressure-flow relationships were obtained during oral and nasal breathing. Moreover, effective treatment pressure is obtained when constant pressure is applied through either the nasal or oral route.