INTRATHORACIC VAGOTOMY PREVENTS THE INHIBITION OF NON-NUTRITIVE SWALLOWING BY NASAL CPAP

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It has been revealed in the literature that the application of a nasal CPAP inhibits swallowing in adult humans (Nishino T et al, 1989) and in newborn lambs during quiet sleep (Samson N et al, 2005). The precise mechanism by which swallowing is inhibited by a nasal CPAP remains unclear. Recently, we have shown that a CPAP directly administered through a cuffed tracheostomy inhibits non-nutritive swallowing (NNS) in the newborn lamb, suggesting that the inhibiting effect of nasal CPAP on NNS is mainly mediated through vagal afferent messages originating from bronchopulmonary receptors (Samson N et al, 2006). The present study aimed at testing the hypothesis that 1) NNS inhibition is prevented by intrathoracic bivagotomy; 2) Intrathoracic bivagotomy alters the swallowing-breathing coordination.

Method: Six lambs underwent surgery at 48h after birth for both chronic instrumentation + 2-step bilateral intrathoracic vagotomy using video assisted thoracic surgery. Two days later, polysomnographic recordings, including NNS, respiratory movements and states of alertness were performed in three experimental conditions in a random order: 1) Normal breathing without nasal CPAP and with intact vagus nerve (control condition); 2) Nasal application of CPAP 6 cm H₂O with intact vagus nerves; 3) Nasal application of CPAP 6 cm H₂O after bilateral vagotomy.

Results: Compared with control conditions, application of nasal CPAP 6 cm H₂O with intact vagus nerves inhibits NNS during quiet sleep (P < 0.0001). This NNS inhibition was prevented after bilateral vagotomy (P = 0.64 vs. control). Overall, swallowing-breathing coordination is not altered by a bilateral vagotomy.

Conclusion: These results reveal that eliminating vagal afferent messages originating from the lower airway receptors prevents the inhibition of NNS by nasal CPAP 6 cm H₂O, thus suggesting the implication of bronchopulmonary receptors, likely the slow adapting receptors. In addition, these results suggest that vagal afferent messages are not crucial for swallowing-breathing coordination. Further studies are ongoing in a group of lambs with chronic laryngo-tracheal separation to confirm our hypothesis and to test whether reflexes originating in the upper airways yet contribute to NNS inhibition.

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