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## **Mandibular advancement decreases pressures in the tissues surrounding the upper airway in rabbits.**

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The pharyngeal airway can be considered as an airway luminal shape formed by surrounding tissues, contained within a bony enclosure formed by the mandible, skull base, and cervical vertebrae. Mandibular advancement (MA), a therapy for obstructive sleep apnea, is thought to increase the size of this bony enclosure and to decrease the pressure in the upper airway extraluminal tissue space (ETP). We examined the effect of MA on upper airway airflow resistance ( $R_{ua}$ ) and ETP in a rabbit model. We studied 11 male, supine, anesthetized, spontaneously breathing New Zealand White rabbits in which ETP was measured via pressure transducer-tipped catheters inserted into the tissues surrounding the lateral (ETP<sub>lat</sub>) and anterior (ETP<sub>ant</sub>) pharyngeal wall. Airflow, measured via surgically inserted pneumotachograph in series with the trachea, and tracheal pressure were recorded while graded MA at 75 degrees and 100 degrees to the horizontal was performed using an external traction device. Data were analyzed using a linear mixed-effects statistical model. We found that MA at 100 degrees increased mouth opening from 4.7  $\pm$  0.4 to 6.6  $\pm$  0.4 (SE) mm ( $n = 7$ ;  $P < 0.004$ ), whereas mouth opening did not change from baseline (4.0  $\pm$  0.2 mm) with MA at 75 degrees. MA at both 75 degrees and 100 degrees decreased mean ETP<sub>lat</sub> and ETP<sub>ant</sub> by approximately 0.1 cmH<sub>2</sub>O/mm MA ( $n = 7-11$ ; all  $P < 0.0005$ ). However, the fall in  $R_{ua}$  (measured at 20 ml/s) with MA was greater for MA at 75 degrees (approximately 0.03 mmH<sub>2</sub>O.ml<sup>-1</sup>.s.mm<sup>-1</sup>) than at 100 degrees (approximately 0.01 mmH<sub>2</sub>O.ml<sup>-1</sup>.s.mm<sup>-1</sup>;  $P < 0.02$ ). From these findings, we conclude that MA decreases ETP and is more effective in reducing  $R_{ua}$  without mouth opening.

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