Tolerance & Efficacy of High-Flow Nasal Oxygen

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In the Literature

Jagodich TA, Bersenas AME, Bateman SW, Kerr CL. Comparison of high flow nasal cannula oxygen administration to traditional nasal cannula oxygen therapy in healthy dogs. *J Vet Emerg Crit Care (San Antonio).* 2019;29(3):246-255.

FROM THE PAGE ...

In cases of severe hypoxemia, use of a traditional nasal cannula or oxygen-enriched environment may not be sufficient to support oxygenation, in which case mechanical ventilation may be necessary.[1] However, given the need for specialized equipment and expertise, mechanical ventilation may not be practical in many clinical situations. The opportunity to provide higher levels of supplemental oxygen and continuous positive airway pressure (CPAP) may allow for respiratory support without mechanical ventilation.

High-flow nasal cannula (HFNC) oxygen delivery systems have been developed and used in human medicine with the goal of delivering much higher flows of oxygen, which are better tolerated than traditional flows as the systems heat and humidify the air. In addition, the tight seal and high flow of oxygen allow the generation of CPAP, which mimics the effects of positive end expiratory pressure achievable with mechanical ventilation. Both CPAP and positive end expiratory pressure can help improve pulmonary function by decreasing atelectasis and promoting lung recruitment. This research study sought to determine the safety and efficacy associated with application of an HFNC system to dogs.

A total of 8 healthy dogs were included in this randomized crossover study. Study groups included traditional nasal cannula (at 0.1, 0.2, and 0.4 L/kg/min flow rates) and HFNC with subjects either awake or sedated (at 0.4, 1, 2, and 2.5 L/kg/min flow rates). Measured parameters included inspiratory and expiratory airway pressure, fraction of inspired oxygen (FiO_2), partial pressure of oxygen, partial pressure of carbon dioxide, temperature, heart and respiratory rate, arterial blood pressure, and pulse oximetry. Complications and predefined tolerance and respiratory scores were also assessed.

The HFNC junior interface fit well on 3 dogs; however, the adult interface had to be modified to fit well on the other 5 dogs. No differences were found with regard to vital parameters between the traditional nasal cannula and HFNC groups. The HFNC group showed good tolerance at 0.4 and 1 L/kg/min, acceptable tolerance at 2 L/kg/min, and poor tolerance at 2.5 L/kg/min, with CPAP being achieved at flows ≥1 L/kg/min. Dogs in the traditional nasal cannula group receiving 0.1 L/kg/min failed to have an increase in FiO_2 but achieved an average of 50% at 0.2 L/kg/min and 72% at 0.4 L/kg/min. With HFNC, FiO_2 averaged 72% at 0.4 L/kg/min and 95% for all other flow rates assessed, with minimal impact on ventilation. Dogs receiving HFNC showed radiographic evidence of aerophagia, but no other complications were noted.

… TO YOUR PATIENTS

Key pearls to put into practice:

1. Although previously reported to be effective,[1] traditional nasal oxygen supplementation with 0.1 L/kg/min failed to achieve FiO_2 statistically different from room air in this study. Target levels of 0.2 to 0.4 L/kg/min should be considered.
2. HFNC oxygen therapy is well-tolerated at rates of 0.4 L/kg/min to 2 L/kg/min and can achieve CPAP at flows ≥1 L/kg/min with no significant complications. Nasal cannulas may need to be modified for medium- to large-sized dogs to achieve an appropriate fit/seal.
3. The dogs in this study had normal lungs. How these results extrapolate to patients with pulmonary compromise remains to be determined.

Reference

1. Dunphy ED, Mann FA, Dodham JR, et al. Comparison of unilateral versus bilateral nasal catheters for oxygen administration in dogs. *J Vet Emerg Crit Care (San Antonio).* 2002;12(4):245-251.

Research Note: **Once-Monthly Treatment for Feline Diabetes**

Glucagon-like peptide-1 receptor agonists (GLP-1RAs) such as exenatide show promise in the treatment of feline diabetes. GLP-1RAs stimulate insulin secretion by pancreatic β cells in the presence of high glucose levels. The investigators in this study developed a delivery system that allowed the slow release of a stable GLP-1RA analog, [Gln28]exenatide. The study first validated the pharmacokinetics and pharmacodynamics of exenatide vs [Gln128]exenatide in cats, after which the conjugate compound consisting of [Gln28]exenatide bonded to hydrogel microspheres was evaluated. The plasma half-life of the SC administered microsphere-[Gln28] exenatide conjugate was ≈40 days as compared with 40 minutes with the injected free peptide. The investigators concluded that GLP-1RA in this formulation is suitable for once-monthly SC administration in cats.

Source

Schneider EL, Reid R, Parkes DG, Lutz TA, Ashley GW, Santi DV. A once-monthly GLP-1 receptor agonist for treatment of diabetic cats. *Domest Anim Endocrinol*. 2020;70:106373.