Evaluation of Thermal Antinociceptive Effects of Intramuscular Hydromorphone Hydrochloride in Great Horned Owls (Bubo virginianus)

Marissa Rae Monopoli, David Sanchez-Migallon Guzman, Joanne Paul-Murphy, Hugues Beauprè, and Michelle G. Hawkins

Abstract: Across the Americas, great horned owls (Bubo virginianus) are often presented to veterinarians for conditions requiring pain management. Although recent studies have evaluated opioid drugs in raptor species, information in Strigiformes is lacking. The objective of this study was to evaluate the analgesic effect and duration of action of hydromorphone hydrochloride, a full μ-opioid receptor agonist, in great horned owls. In a randomized, blinded, balanced crossover study, 6 adult birds (5 females and 1 male) received hydromorphone (0.3 and 0.6 mg/kg) or saline (0.9% NaCl) solution (0.03 mL/kg; control) in the left pectoral muscle, with a 7-day washout interval between treatments. Each bird was assigned an agitation-sedation score, and the thermal foot withdrawal threshold (TFWT) was measured at predetermined times before (t = 0 hours) and after treatment administration (t = 0.5, 1, 3, and 6 hours). Measurements of the TFWT were obtained with a test box equipped with a thermal perch, which delivered a gradually increasing temperature 40–62°C (104–143.6°F) to the right plantar surface of the owl’s foot. Compared with controls, hydromorphone at 0.3 mg/kg dose resulted in significantly higher mean TFWT at 0.5 hours (P < 0.001), 1.5 hours (P = 0.003), and 3 hours (P = 0.005), whereas the 0.6 mg/kg dose resulted in significantly higher mean TFWT from 0.5 hours (P = 0.035) to 1.5 hours (P = 0.001). Both hydromorphone doses were associated with a significant change in the agitation-sedation score (P = 0.001), consistent with mild to moderate sedation. Two owls were observed tremoring after administration of the 0.6 mg/kg dose, which was not noted after the 0.5-hour timepoint; no other adverse effects were identified. This study offers scientific evidence to support the use of a μ-opioid agonist in great horned owls for pain management. Pharmacokinetics and other pharmacodynamic studies of other pain models evaluating hydromorphone and other opioid drugs in this species are still needed.