Umbilical vein catheterization as an option for intravenous access in neonatal puppies

Soon Hon Cheong,* Nicholas Walsh,* Allison Miller,* Marian Diel de Amorim,* Ian Porter,* Peter Scrivani*

*Department of Clinical Sciences, Department of Biomedical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY

Intravenous access is essential to manage critically ill neonatal puppies and is difficult to achieve. Intravenous access is achieved most commonly using intraosseous catheters but potential damage to the bone and growth plate is possible. In human neonatology, umbilical vein catheterization is the primary route of intravenous access in infants. This procedure has not been widely adopted in dogs. In hopes of using this procedure in neonatal puppies, the study objective was to determine the success rate of umbilical vein catheterization evaluated by gross dissection and imaging. Six neonatal puppies were used for the study (size range: Saint Bernard to Shih Tzu) and were either stillborn or died shortly after birth. A 26-gauge intravenous catheter was used to achieve vascular access by holding the umbilicus at a 45-degree angle from a dorsal plane through the abdomen. Entry from the ventral side of the umbilicus allowed a shallow puncture to enter the umbilical vein and easy sliding of the catheter into the vessel. A mixture of 4:1 latex:60% w/v barium sulfate suspension was administered into the catheter (total volume: Saint Bernard, 2 ml; Shih Tzu, 1 ml). Latex aided in vascular dissection and barium provided contrast during computed tomography that was performed using a 16-slice scanner (Aquilion LB, Toshiba/Canon America Medical Systems, Tustin, CA) using these parameters: sternal recumbency; slice thickness, 0.5 mm; reconstruction interval, 1.0 mm; 120 kVp; 50 mAs. Based on dissection and imaging, umbilical vein catheterization was successful in 4/6 puppies; 1/6 (injections) was into the umbilical artery and 1/6 was extravascular (Figure). Umbilical vein catheterization was successful 67% of the time and may be a worthwhile means for vascular access in critically ill neonatal puppies. Future studies using live puppies and maintaining catheter patency over time are warranted.

Keywords: Puppy, umbilicus, catheterization, imaging, neonatology

Figure. Catheter in umbilical artery and vein confirmed using computed tomography with barium contrast enhancement