

Intracranial Trauma in a Dog due to Being “Swung” at Birth

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A male Labrador Retriever neonate presented for evaluation 8 hours after birth because of the onset of generalized seizure activity. The neonate was one of 8 puppies delivered over a 19-hour period to a 4-year-old female Labrador Retriever at an assistance dog breeding colony. Uterine and fetal heart monitoring were performed during the first and second stages of labor; secondary uterine inertia was diagnosed 10 hours after the onset of stage-1 labor. In addition to standard medical therapy, manual assistance was provided for the delivery of all but the second puppy (feathering, pulling, elevating forequarters, abdominal compression). The puppy presented was the third puppy born. At birth, resuscitation efforts were instituted because of a lack of spontaneous breathing and bradycardia. In an effort to remove amniotic fluid from the airways, the puppy was “swung” by an experienced attendee in an arch from mid-abdomen height to knee height while cradled in both hands with the head stabilized. Initial evaluation of the puppy revealed normal blood glucose and no ultrasonographic evidence of hydrocephalus. Because of continued seizure activity, euthanasia and necropsy were elected. At necropsy, there was gross evidence of subdural hematoma formation. Subsequent histopathology of the brain, liver, lung, spleen, small intestine, colon, and kidney revealed subdural and intracerebral hemorrhage. Findings were consistent with high-velocity deceleration trauma (“shaken baby syndrome”). Traditional neonatal resuscitation via “swinging” is a dangerous and potentially lethal practice capable of inducing significant brain trauma in the canine neonate.

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A male Labrador Retriever neonate was examined 8 hours after birth because of the onset of seizure activity. Seizures were characterized by generalized muscle fasciculation, full-body twitching, and loss of consciousness. Each episode was approximately 20 seconds in length, and the puppy was not readily rousable during the interictal phase. A total of 2 seizures were recorded before presentation.

The neonate was 1 of 8 puppies delivered over a 19-hour period to a 48-month-old female Labrador Retriever. The litter described represented her third whelping. Whelping occurred at 65 days of gestation (as determined on the basis of estimation of the luteinizing hormone [LH] surge by evaluation of serial serum progesterone concentrations to detect the initial increase to > 2 ng of progesterone/mL). Uterine and

fetal heart monitoring (Whelpwise; Veterinary Perinatal Services, Wheat Ridge, CO) were performed during the first and second stages of labor; secondary uterine inertia was diagnosed 10 hours after the onset of stage-1 labor. Dystocia was medically treated by subcutaneous administration of calcium gluconate 10% (total dose, 13.95 mEq; American Regent Laboratories Inc, Shirley, NY) and oxytocin (total dose, 6.5 units, 10 USP/mL; American Pharmaceuticals Partners, Inc, Los Angeles, CA), in addition to manual assistance for the delivery of all but the second puppy (feathering, pulling, elevating forequarters, abdominal compression). Some of the recorded fetal heart rates were consistent with fetal distress (range, 130-210 beats per minute).

At the time of whelping, the bitch was current on all vaccinations (distemper, canine adenovirus type-2, parvovirus, parainfluenza, rabies, and *Bordetella bronchiseptica*) and was receiving regular heartworm prophylaxis. Serological testing for brucellosis had been completed every 6 months; all test results were negative. The bitch had a medical history of chronic otitis externa associated with *Malassezia* species, but no aural treatment or other medications had been administered during pregnancy other than routine heartworm prophylaxis. Prior litters were delivered at 24 and 36 months of age. For the first pregnancy, the bitch whelped prematurely at

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60 days of gestation (as determined on the basis of estimation of the LH surge by evaluation of serial serum progesterone concentrations). The bitch gave birth to 11 puppies, 8 of which were stillborn. Premature labor was attributed to bacterial placentitis and subsequent metritis based on pure bacterial culture of nonenteric Gram-negative rods from a fetal membrane (ie, placenta). For the second pregnancy, onset of whelping occurred at 65 days' gestation (as determined on the basis of estimation of the LH surge by evaluation of serial serum progesterone concentrations). Eight puppies were delivered during a 5-hour period; the last of which was stillborn.

For the current litter, the puppy presented was the third puppy born. At birth, resuscitation efforts were instituted because of a lack of spontaneous breathing and subsequent hypoxemia-induced bradycardia. The puppy's heart rate at birth was 80 beats per minute. Initially, in an effort to remove amniotic fluid from the airways, the puppy was "swung" by an experienced attendee in an arch from mid-abdomen height to knee height while cradled with the head stabilized, as commonly described for canine and feline neonate resuscitation. Supplemental oxygen was administered in conjunction with manual stimulation (rubbing), and the JenChung acupressure point was stimulated with a 25-gauge needle to stimulate breathing. Once the puppy was dry, it was placed in an infant incubator with the temperature set at 32°C (90°F). Ambient humidity in the kennel was maintained at 50%. No other puppy in the litter was resuscitated in this manner. The puppy was bottle-fed approximately 3 mL of colostrum obtained by milking the dam within 6 hours of birth.

Initial physical examination of the puppy revealed a quiet, hydrated puppy with cardinal signs within normal limits (rectal temperature was 37°C [98°F], heart rate was 220 beats per minute, and respiratory rate was 15 breaths per minute). The remainder of the physical examination failed to reveal any significant abnormalities and included evaluation of the abdomen, perineal area, and toes for signs consistent with sepsis, in addition to evaluation of the oral cavity for congenital abnormalities. Neurologic examination was limited because of the age at presentation; however, rooting reflexes, reflex urination, and righting response were present and evaluated as normal. The predominant posture was flexion.

Differential diagnoses for seizures in a canine neonate include degenerative (storage disease), developmental (hydrocephalus), toxic (lead, organophosphates, hydrocarbons), infectious (canine distemper, *Toxoplasma gondii*, *Neospora caninum*, encephalitis), metabolic (hypoglycemia, portocaval shunt, hepatic insufficiency/encephalopathy), nutritional (thiamine, parasitism), and trauma. The kennel environment was a professionally maintained, controlled-environment whelping kennel. Stringent hygiene regulations and handling protocols were established, and there was no known access or exposure to toxins. Toxin transfer from the dam was felt unlikely.

Initial diagnostics were limited because of the patient's body weight and estimated blood volume of approximately 35 mL (90 mL/kg). Serum blood glucose was evaluated via an

ear prick blood sample and the use of a human portable blood glucose testing device (Ascensia Elite XL; Bayer, Tarrytown, NY). The obtained value of 47 g/dL was considered age and species appropriate. Transfontanel ultrasonography was used to evaluate for evidence of hydrocephalus. The lateral ventricles were not dilated, confluent, or consistent with hydrocephalus.

Because of the patient's size and age, initial therapy consisted of supportive care (warmth, nutritional support, stimulation of urination and defecation, and 24-hour monitoring). Medical therapy with anticonvulsants such as phenobarbital and potassium bromide were not commenced because of dosing difficulties and concerns regarding the impact of hepatic enzyme development and incomplete nephrogenesis on excretion and toxicity. After initial evaluation, the puppy continued to exhibit seizure activity with increasing severity. He was euthanized within 12 hours of birth, and immediate necropsy was performed.

At necropsy, the overall body condition was good, and there were no external signs of trauma. Significant findings were limited to gross evidence of subdural hemorrhage on removal of a section of the frontal and parietal bones without evidence of significant hemorrhage in any other organ. Samples submitted for histology included the thymus, liver, lung, spleen, small intestine, colon, kidney, and brain (entire). Histopathology revealed acute subdural and intracerebral hemorrhage (Figs 1 and 2) without any evidence of trauma or abnormality in any other tissue.

Discussion

Intracranial bleeding as a result of violent shaking was first described in children in 1946 and later termed "whiplash shaken baby syndrome" to describe the clinicopathologic combination of retinal hemorrhage and subdural/subarachnoid hemorrhage, with minimal signs of external trauma, in

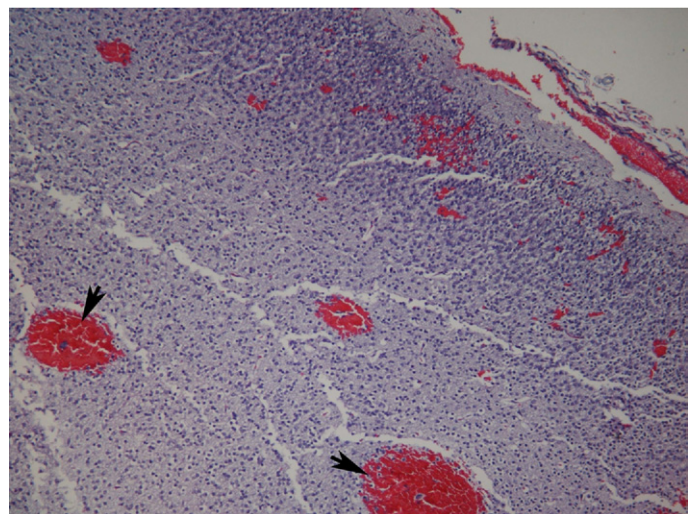


Figure 1. Multiple foci of acute intracerebral hemorrhage (arrows). Hematoxylin and eosin, 10× magnification.

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