

Coil embolization of a congenital orbital varix in a dog

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- ▶ A varix is an abnormally dilated and tortuous vein. Orbital varices most often are congenital and may be a result of abnormal embryologic vascular development or intrauterine growth retardation.
- ▶ Coil embolization may be an alternative to surgical excision in dogs with orbital varices.

A 10-week-old 9-kg (19.8-lb) sexually intact female Labrador Retriever was referred for evaluation and treatment of a swelling above the left eye and lateral strabismus of the eye of 8 weeks' duration. The swelling reportedly increased in size if pressure was applied to the dog's neck.

Results of an ophthalmic examination of the right eye were unremarkable. Abnormalities detected during examination of the left eye included mild exophthalmos, mild exotropia, and a subconjunctival lesion at the 11 o'clock position. This lesion was tubular, light pink, and slightly raised; it was 3 to 4 mm wide and extended from the limbus to the fornix and into the dorsal eyelid. The lesion affected the entire margin of the dorsal eyelid and extended 2 cm dorsal to the eyelid margin (Figure 1). With compression of the left jugular vein, the exophthalmos worsened immediately and the subconjunctival and eyelid lesion enlarged. Auscultation of the orbit did not reveal a bruit, and results of a physical examination were otherwise unremarkable.

The dog was hospitalized, and a CBC, serum biochemistry profile, and urinalysis were performed. Results were within reference limits. The dog was sedated, and B-mode ultrasonography of the left globe and orbit was performed with a 9.0-MHz linear transducer.^a A large, oval cystic lesion that displaced the globe laterally was seen in the medial portion of the retrobulbar space. Color-flow Doppler imaging indicated that the lesion was a blood vessel with unidirectional blood flow. The dog was anesthetized for computed tomography^b of the skull and orbit. Sequential transverse and dorsal plane images were obtained before and after IV administration of a contrast agent. A large (range, 1.2 to 3.7 cm in diameter), irregular lesion that enhanced following contrast administration was seen in the medial portion of the retrobul-

bar space (Figure 2). A 2-cm-wide, irregularly shaped mineralized shell was present within the lesion. The appearance of this shell was consistent with a blood clot.

An attempt to catheterize the facial vein for orbital venography failed. Blood was withdrawn from the eyelid lesion and from an antecubital vein. The PCV, total solids concentration, BUN concentration, and blood gas partial pressures in these 2 samples were identical, suggesting that the lesion was venous and ruling out an arteriovenous fistula.¹ Nonselective carotid angiography confirmed that there was no arteriovenous connection. On the basis of results of initial diagnostic testing, a presumptive diagnosis of an orbital varix was made.

A 23-gauge butterfly catheter was introduced through the eyelid and into the lesion. Radiography of



Figure 1—Photograph of a 10-week-old Labrador Retriever examined because of an orbital varix involving the left eye. Notice the large swelling of the dorsal eyelid, mild exotropia, exophthalmos, and protruding third eyelid with hyperemia of the conjunctiva.

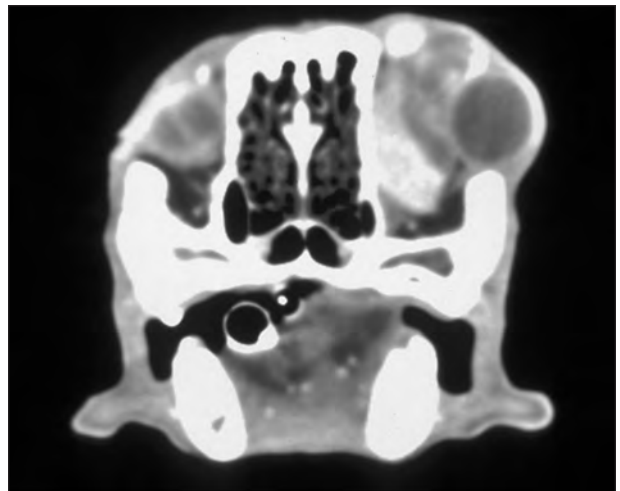


Figure 2—Contrast-enhanced transverse computed tomographic image of the head of the dog in Figure 1. Notice the large irregular lesion in the left orbit, displacing the globe temporally.

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the skull following injection of contrast medium into the lesion revealed a large dilated vessel in the dorsal portion of the orbit. Contrast medium drained from this vessel into the angular vein. The vessel was cystic and had a variable diameter. Contrast medium was not seen in the retrobulbar space. When the angular vein was compressed and contrast medium was again injected into the lesion, another sacculcation became apparent (Figure 3). This second sacculcation was posterior and nasal to the globe. Contrast medium drained from the sacculcations into 3 veins that exited the orbit, proving that the lesion was an orbital varix.

Therapeutic options that were considered included surgical excision of the orbital varix via a lateral orbitotomy² and coil embolization.^{3,4} Coil embolization was elected to prevent the pain and morbidity associated with an orbitotomy. In addition, orbitotomy would have been difficult in this dog because of the posterior location of the varix, and the orbital contents could have been damaged during an orbitotomy.³

For coil embolization of the varix, the dog was anesthetized and a 22-gauge IV catheter was inserted through the upper eyelid into the varix. The orbital varix was embolized with stainless steel coils placed under fluoroscopic guidance. Prior to implantation, each coil was housed in a straight stainless steel tube. One tube at a time was placed in the hub of the IV catheter, and the coil was extruded from the stainless steel tube, through the IV catheter and into the varix, with a guidewire. Initially, coils were placed into the posterior aspect of the varix, and then additional coils were placed in the anterior aspect of the varix. Injection of contrast medium into the lesion enhanced visualization during coil placement⁵ (Figure 4). Coils were placed in the orbital varix until blood flow was no longer seen following injection of additional contrast medium.^{5,6} A total of 36 coils, including 20 coils that were 5 cm long and had a loop diameter of 8 mm after implantation, 5 coils that were 4 cm long and had a loop diameter of 8 mm, 8 coils that were 5 cm long and had a loop diameter of 5 mm, 2 coils that were 4 cm long and had a loop diameter of 5 mm, and 1 coil that was 5 cm long and had a loop diameter of 3 mm (all coils were 0.035 inches in diameter), were implanted in the orbital varix. Moderately severe orbital swelling occurred during the procedure.

Postoperative treatment included administration of ketoprofen (1 mg/kg [0.45 mg/lb], IM, q 24 h for 4 days), hydromorphone (0.1 mg/kg [0.045 mg/lb], IM, as needed), acepromazine (0.025 mg/kg [0.011 mg/lb], SC, as needed), cefazolin (22 mg/kg [10 mg/lb], IV, q 6 h), and crystalloid fluids (10 mL/kg/h [4.5 mL/kg/h], IV, for 24 h). An Elizabethan collar was used to prevent self-trauma. An ice pack was applied to the orbit every 6 hours to reduce swelling.

Two days after the procedure, antimicrobial treatment was changed to amoxicillin-clavulanate (22 mg/kg, PO, q 12 h for 1 week). The dog was discharged 5 days after the procedure, and the owners were instructed to restrict the dog's activity for 2 weeks.

The owners reported that the lesion resolved 2 weeks after the procedure. Four months after the procedure, the only abnormality evident during a follow-



Figure 3—Lateral fluoroscopic image of the left orbit of the dog in Figure 1. Contrast medium was injected into the lesion of the left dorsal eyelid lesion while the angular vein was compressed to force the contrast medium to flow posteriorly. Notice the small oval area of contrast anteriorly and the irregular sacculcation posteriorly connected by a small tubular structure. The circular opacity anterior to the lesion is a hemostat handle, which was used to compress the angular vein.

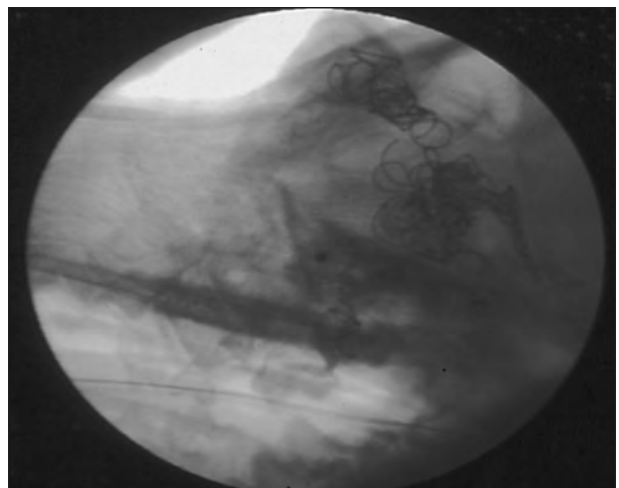


Figure 4—Lateral fluoroscopic image of the left orbit of the dog in Figure 1 during coil embolization of the orbital varix. Notice the numerous embolization coils posterior and dorsal to the globe.

up ophthalmic examination was slight congestion of the conjunctival vessels of the left eye. Ocular ultrasonography of the left eye with color-flow Doppler imaging revealed normal blood flow in the left retrobulbar space. Computed tomography demonstrated numerous metallic objects in the retrobulbar space of the left eye consistent with coil embolization. The dog was clinically normal 15 months after the procedure.

To our knowledge, only 2 cases of orbital varices, 1 involving a dog⁷ and 1 involving an iguana,⁸ have been described in the veterinary literature. Orbital varices are uncommon in humans.⁹ Those that have been reported have typically been congenital,¹⁰ although traumatic varices have been reported,¹¹ usually affected the left eye,⁹ and sometimes were not

observed clinically until adulthood.^{10,12} Intermittent exophthalmos, as seen in the dog described in the present report, is the most common initial complaint. Considering this dog's age at the onset of clinical signs and the lack of historical and physical evidence suggestive of trauma, it is likely that this orbital varix was a congenital lesion.

Orbital varices are anomalous, and the pathophysiology of these lesions is unknown.^{9,13} Spinal angiomas in humans typically occur on the dorsal surface of the spinal cord, leading to speculation that they may be related to the embryologic development of the spinal vasculature.¹⁴ In a review of 26 cases of fetal venous anomalies in humans, fetal malformations and intrauterine growth retardation were hypothesized as the underlying causes.¹⁵ By extension, one might hypothesize that orbital varices are the result of abnormal embryologic vascular development or intrauterine growth retardation.

The venous system of the orbit in dogs consists of the angular vein and the dorsal and ventral external ophthalmic veins.¹⁶ Injection of contrast medium directly into the lesion in the dog described in the present report indicated that the lesion was a vein. Given the location of the vein and its course in this dog, it is likely that this orbital varix affected the left dorsal external ophthalmic vein.

Treatment of the iguana previously reported to have an orbital varix consisted of enucleation and surgical excision of the varix⁸; the dog previously reported to have an orbital varix was euthanatized.⁷ In the dog described in the present report, treatment was undertaken to prevent the complications seen in humans with untreated orbital varices, which include hemorrhage,³ visual deficits secondary to prolonged exotropia,¹⁰ ocular hypertension,¹⁰ proptosis,¹³ ulcerative keratitis,¹⁰ and blindness.³ Surgical excision has been successful in humans,^{3,9,10,12,13} but was not attempted in the dog described in the present report because of the risk of damage to the globe and surrounding structures and the possibility of severe intraoperative hemorrhage, which would require enucleation.³

Coil embolization was selected for treatment of the dog described in the present report because it is relatively noninvasive, because it has been associated with low morbidity rates, and because additional coils could be implanted at a later date if needed.^{3,6,17} With this technique, the coils fill the cavity of the varix, causing thrombosis of the vessel. Fibrous tissue then forms around the coils.¹⁸ Disadvantages of coil embolization include the special equipment and skills required to use this technique, limited experience with this technique in veterinary medicine, and expense.

Possible complications of coil embolization include inadvertent introduction of coils into the systemic circulation,¹⁹ hemolysis,²⁰ occlusion of a normal

blood vessel,²¹ hemorrhage,²² and coil migration.¹⁷ Moderate swelling was the only complication seen in the dog described in the present report.

- a. SSA370A PowerVision 6000 ultrasound scanner, Toshiba, Duluth, Ga.
- b. IQ Premier Xtra CT scanner, Picker, Cleveland, Ohio.

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