Title

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Journal

The Canadian veterinary journal. La revue veterinaire canadienne, 61(3)

ISSN

0008-5286

Authors

Charnock, Lauren

Doran, Brianna

Milley, Ellen

et al.

Publication Date

2020-03-01

Peer reviewed

Case Report Rapport de cas

Canine retrobulbar lipoma excision through a ventral transpalpebral anterior orbitotomy

Lauren Charnock, Brianna Doran, Ellen Milley, Timothy Preston

Abstract — A 5-year-old spayed female German shepherd dog was referred for diagnostic evaluation and treatment of progressive exophthalmos, conjunctival hyperemia, and protrusion of the third eyelid of the left eye. Computed tomography revealed a retrobulbar mass of the orbit, exhibiting radio attenuation consistent with adipose tissue and well-defined margins. No evidence of metastasis was detected on thoracic radiographs or abdominal ultrasound. Cytological evaluation of ultrasound-guided fine-needle aspirates was inconclusive. A ventral transpalpebral anterior orbitotomy approach facilitated excision of the abnormal retrobulbar tissue. Histopathology revealed mature adipose cells compatible with a lipoma. The patient regained normal appearance and function 3 months after surgery.

Key clinical message:
While rare, consider a lipoma as a differential diagnosis for a retrobulbar mass. The ventral transpalpebral orbitotomy has been described in only 3 cases in the veterinary literature, and this is the only known report of utilizing this approach for excision of a neoplastic condition.

Résumé — Excision d'un lipome rétrobulbaire canin à travers une orbitotomie antérieure ventrale transpalpébrale. Une chienne Berger Allemand stérilisée âgée de 5 ans fut référée pour évaluation diagnostique et traitement d'exophtalmie progressive, d'hyperémie conjonctivale et de protrusion de la troisième paupière de l'œil gauche. Un examen par tomodensitométrie révéla une masse rétrobulbaire de l'orbite, montrant de la radio-atténuation compatible avec du tissu adipeux et des bordures bien définies. Aucune évidence de métastase ne fut détectée sur les radiographies thoraciques ou une échographie abdominale. Une évaluation cytologique d'aspirations écho-guidées à l'aiguille fine était non-concluante. Une orbitotomie antérieure par approche transpalpébrale ventrale facilita l'excision du tissu rétrobulbaire anormal. L'examen histopathologique mis en évidence des cellules adipeuses matures compatibles avec un lipome. Le patient retrouva une apparence et une fonction normales 3 mois après la chirurgie.

Message clinique important :
Bien que rare, un lipome doit être considéré comme un diagnostic différentiel lors de masse rétro-bulbaire. L'orbitotomie ventrale transpalpébrale a été décrite dans seulement trois cas dans la littérature vétérinaire, et le présent rapport est le seul connu utilisant cette approche pour l'excision d'une condition néoplasique.

(Traduit par Dr Serge Messier)

Can Vet J 2020;61:257–262

Due to the confined space of the orbit, a retrobulbar mass can result in various clinical signs. In a retrospective study of 25 small animal cases published in 2001, the most commonly identified signs were exophthalmos (84% of cases), conjunctival hyperemia (40%), protrusion of the nictitating membrane (28%), exposure keratitis (20%), and fundic abnormalities (20%) such as retinal detachment, edema, and vascular changes (1). Etiologies for a retrobulbar mass include inflammatory causes (such as abscessation, cellulitis, trauma, and hematoma formation), immune-mediated conditions, orbital cyst-type lesions (such as sialoceles), vascular anomalies, emphysema, or neoplasia (2–10).

A lipoma is a benign tumor of mesenchymal origin arising from fat and is one of the more commonly diagnosed canine neoplasms. Lipomas could develop anywhere on the body within the subcutis (11) but could also develop in body cavities or

Atlantic Veterinary College, University of Prince Edward Island, 550 University Avenue, Charlottetown, Prince Edward Island C1A 4P3.

Address all correspondence to Dr. Lauren Charnock; e-mail: lnc0019@auburn.edu

deeper planes of fascia and muscle (4,11–13). These tumors can be asymptomatic but they can cause functional deficits when in specific locations, such as the orbit.

This report describes an orbital lipoma and highlights its rarity in anatomic location as well as the surgical approach. Surgical resection of an orbital lipoma in a dog was the focus of 1 previous case report (14). In that case, the lipoma was protruding from the dorsal conjunctival sac and accessible through a transconjunctival orbitotomy. In the present case, the retrobulbar space was accessed through the recently described ventral transpalpebral orbitotomy (15) and this is the first report of the excision of a benign neoplasm using this surgical approach.

Case description

A 5-year-old spayed female German shepherd dog was presented to the Atlantic Veterinary College (AVC) for evaluation of a 1-month progressive history of exophthalmos and protrusion of the third eyelid *oculus sinister* (OS). A full ophthalmic examination was performed by a Board-certified veterinary ophthalmologist prior to referral. The patient had a 1-year history of pannus and corneal dystrophy *oculus uterque* (OU); the pannus was managed with topical 1% prednisolone acetate (unknown brand) OU. Otherwise, the patient was considered to be in good systemic health. The patient was an active seeing eye guide dog and was dependent on vision for her work.

The patient was bright, alert, and responsive with all vital parameters within acceptable limits. Exophthalmos, conjunctival hyperemia, and protrusion of the third eyelid were observed OS (Figure 1A), and both eyes were assessed to have positive direct and consensual pupillary light reflexes and a positive bilateral menace response. No pain was evident upon local digital palpation or opening of the jaw, and no ocular or nasal discharge was noted. Retropulsion was decreased OS compared to *oculus dexter* (OD). A complete blood cell count and serum biochemistry were performed, with results within reference ranges.

An ocular ultrasound was performed by a Board-certified veterinary radiologist with the patient under general anesthesia. A well-defined hypoechoic mass with multifocal areas of mixed echogenicity located posterior and slightly inferior to the left globe was identified. After preparation of the dorsal conjunctival fornix with 1:50 povidone-iodine solution, transconjunctival ultrasound-guided fine-needle aspirates were collected for cytological evaluation. Results were inconclusive as they were either primarily acellular or contaminated with a moderate amount of blood.

Computed tomography (CT) imaging (Aquilon TSX-101A; Toshiba Medical Systems Corporation, Tustin, California, USA) with 0.3-mm slices identified a hypoattenuating space-occupying retrobulbar mass of the left eye with similar Hounsfield units (−100 HU) to the surrounding retrobulbar fat OS and that of the right eye (Figure 2). Despite causing rostral, dorsal, and lateral displacement of the left globe, the mass appeared to have well-defined margins and normal-appearing surrounding anatomy, with no contrast enhancement. The mass caused ventral displacement of the ventral rectus muscle and dorsomedial displacement of the medial and dorsal rectus muscles, as well as dorsolateral displacement of the lateral rectus muscle and optic nerve. Further diagnostic imaging consisted of 3-view thoracic radiographs and an abdominal ultrasound, which did not reveal evidence of metastasis.

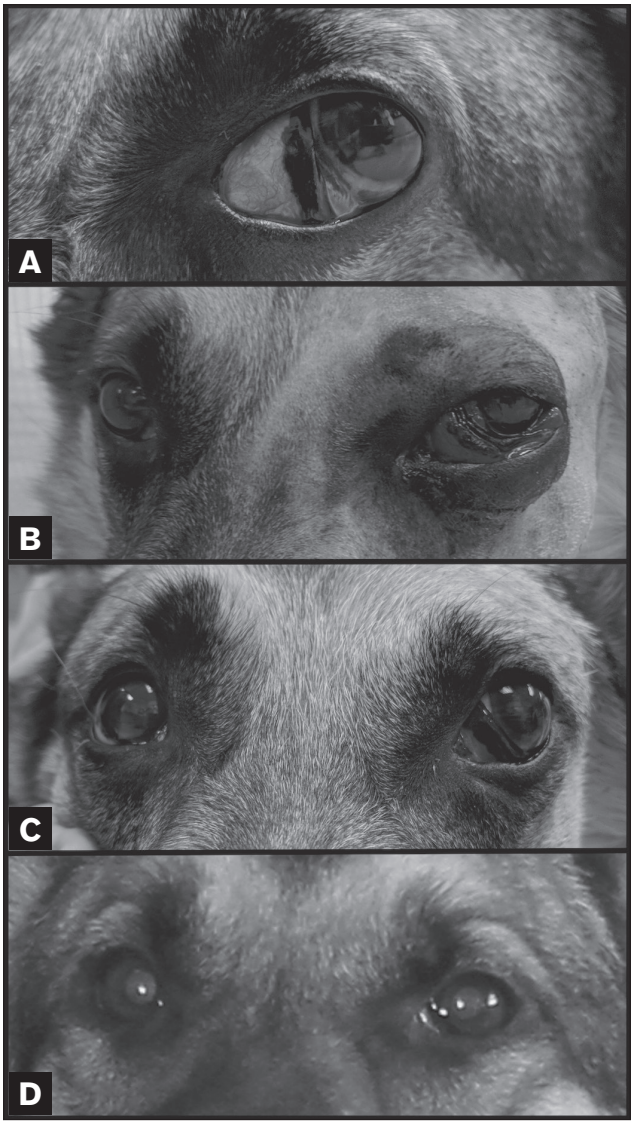

Figure 1. Progression of the patient's exophthalmos on presentation (A), 12 h (B), 4 wk (C), and 6 mo (D) after surgery.

Based on CT results, a working diagnosis of a primarily lipid-based tumor was made, with no evidence of local or distant spread of disease. Excisional biopsy of the retrobulbar mass was therefore elected. The patient was premedicated with hydromorphone (Hydromorphone; Sandoz, Boucherville, Quebec), 0.05 mg/kg body weight (BW), IM and dexmedetomidine (Dexdormitor; Zoetis, Kalamazoo, Michigan, USA), 9 μg/kg BW, IM. General anesthesia was induced with alfaxalone (Alfaxan; Abbott Laboratories, Saint Laurent, Quebec), 1 mg/kg BW, IV, and maintained with isoflurane inhalant throughout the procedure. The patient was placed in sternal recumbency, and the surgery site was aseptically prepared with 1:50 povidone-iodine solution. Cefazolin (Fresenius Kabi Canada, Toronto, Ontario) was administered at 22 mg/kg BW, IV, every 90 min of surgery. Two stay sutures of 4-0 PDS

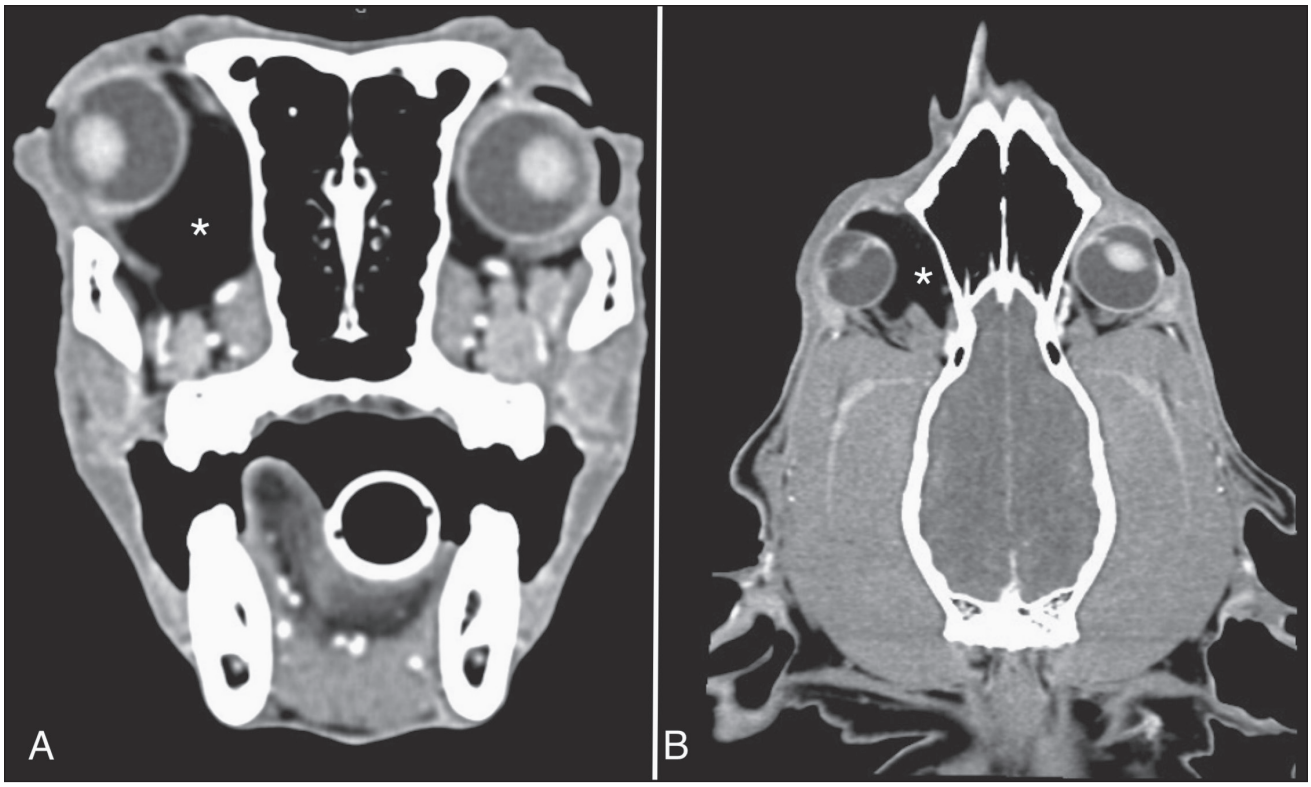

Figure 2. Axial (A) and coronal (B) CT images in a soft tissue window, post-contrast administration. Note the well-demarcated fat-like hypo-attenuating lesion in the caudal aspect of the left orbit (asterisks).

(Ethicon; Johnson & Johnson, Bridgewater, New Jersey, USA) were placed on both the temporal and nasal aspects of the lower eyelid allowing the skin below the eyelid margin to remain taught. A 4-cm incision was then made approximately 1.5 cm below the inferior palpebral lid margin above the ventral orbital rim with a #15 surgical blade, providing a ventral transpalpebral anterior orbitotomy approach. Access to the ventral orbit was achieved through a combination of blunt dissection using Metzenbaum scissors, undermining of connective tissue and extending the skin incision 0.5 cm temporally. Two additional stay sutures were placed on both the dorsal and ventral aspects of the incision allowing for visualization of the rostral aspect of the mass, which was located below the ventral margin of the third eyelid. Care was taken to ensure the third eyelid and gland of the third eyelid were left intact; the approach was ventral to both of these structures, yet dorsal to the ventral orbital floor. A Lone Star Ring retractor (Jorgenson Laboratories, Loveland, Colorado, USA) was placed in the incision site to provide even, circumferential retraction of the incision (Figure 3). Care was taken to avoid excessive traction on the mass due to the proximity of the globe and the optic nerve. A 1 cm wide malleable retractor was also used when needed to apply gentle dorsolateral retraction on the globe. Due to the fatty nature of the mass, *en bloc* removal proved challenging, with the mass fragmenting easily when manipulated; a variety of surgical instruments were used. *En bloc* removal was successful with the use of a bladder spoon in conjunction with Adson tissue forceps. As the mass easily separated with minimal manipulation after removal, several pieces were submitted for histopathology. After excision of the mass, absorbable gelatin sponge (Surgifoam Ethicon, Somerville, New Jersey, USA) was placed behind the globe to minimize dead space and prevent enophthalmos after surgery, as a significant amount of the orbital fat pad was removed along with the mass. The third eyelid was replaced into anatomical position and sutured with 4-0 Monocryl (Ethicon), due to disruption of the ventral attachments of the third eyelid gland during blunt and sharp dissection. The deep subcutaneous tissue was closed with 4-0 Monocryl in a simple continuous pattern, and the dermis was apposed with 5-0 Monocryl in an intradermal pattern.

Multiple sections of the mass were submitted for histopathology, the largest of which measured approximately 3 cm × 1 cm and accounted for approximately half of the total mass. All sections of tissue were histologically similar lobules of mature adipocytes supported by collagenous stroma. The adipocytes were of a uniform population of polygonal cells with distinct cell margins, abundant clear cytoplasm and a single large delineated cytoplasmic vacuole that displaced the small bland ovoid nucleus to the periphery of the cell, extending to the margins of the excised tissue. No mitotic figures were identified. Based on gross and histological findings, the mass consisted of mature adipose tissue, compatible with that of a lipoma.

Following recovery from general anesthesia, marked periorbital and conjunctival swelling, as well as moderate exophthalmos OS were present (Figure 1B). Fluorescein stain was retained OS and negative OD, indicating a superficial, axial corneal ulcer OS. The 1% prednisolone acetate used for the management of pannus OU by the referring veterinary ophthalmologist was temporarily discontinued and tobramycin 0.3%

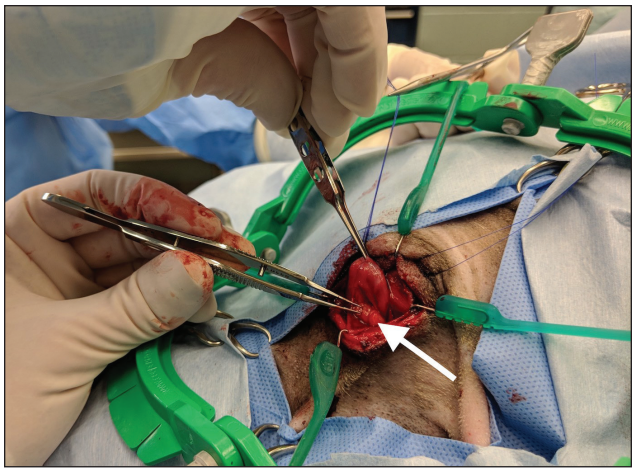

Figure 3. Intra-operative image of the ventral transpalpebral orbitotomy with exposure of the retrobulbar mass (arrow). A Lone Star Ring retractor and stay sutures are utilized to increase visualization.

topical ophthalmic solution (Tobramycin; Sandoz Canada) was administered OS q8h for 7 d. Post-surgical analgesia was provided with meloxicam (Metacam; Boehringer Ingelheim, St. Joseph, Missouri, USA), 0.1 mg/kg BW, PO, q24h for 5 d and gabapentin (Apotex, Toronto, Ontario), 11 mg/kg BW, PO, q12h to q8h for 5 d. Fluorescein stain performed 7 days after surgery was negative OU; tobramycin 0.3% ophthalmic was discontinued, and treatment for pannus with prednisolone acetate 0.1% ophthalmic solution OU was resumed.

The 4-week postoperative recheck revealed mild exophthalmos OS (Figure 1C), and the third eyelid was prolapsed, covering approximately 25% of the cornea. The Surgifoam which was placed within the retrobulbar space during surgery, was expected to slowly resorb over 4 to 6 wk, as per the manufacturer's information. It was anticipated that the globe and third eyelid would return to a normal anatomic position over that period. Twelve weeks after surgery, the owner reported by telephone that the patient's exophthalmos had resolved and there were no apparent visual deficits. The patient had a normal appearance 6 mo after surgery (Figure 1D).

Discussion

In a large retrospective study of humans, lipomas comprised less than 1% of total orbital lesions evaluated (16), making this condition rare among humans as well as among animals. The case presented here describes the unusual anatomic location for a lipoma, with only 1 other case report in the veterinary literature (14). Benign tumors represent only 10% to 25% of reported retrobulbar neoplasia (1) with other possibilities including meningioma, fibroma, and fibrous histiocytoma.

In this case, the patient had non-painful progression of unilateral exophthalmos over an approximately 4-week period, consistent with the progress of an orbital neoplastic condition (1,2,17). It should be noted that presence or lack of pain should not be a definitive factor in developing a complete differential diagnoses list, as swelling and pain can be present with tumor necrosis (2).

Differential diagnoses for a lipomatous orbital mass include an infiltrative lipoma, liposarcoma, and prolapsed orbital fat (18). Prolapsed orbital fat represents 2% of orbital lesions in humans (16), and has been reported in several veterinary patients (18,19). A significant difference between the orbital fat prolapse and a retrobulbar lipoma is the resulting mass effect. Patients with orbital fat prolapse develop enophthalmos, while those with a retrobulbar lipoma develop exophthalmos. Rare reports of orbital hibernomas, neoplasm of brown fat, have also been published recently and contribute to the list of differentials for a benign orbital mass (20,21).

Ventral transpalpebral anterior orbitotomy was chosen as the surgical approach in this case for several reasons. Firstly, based on the working diagnosis, a wide margin for excision was not indicated, so exenteration and orbitectomy were considered radical. Furthermore, the ventral transpalpebral orbitotomy decreased the likelihood of globe and optic nerve manipulation; osteotomies were avoided, and the approach facilitated adequate exposure to the ventromedial orbit and the retrobulbar space without extensive disruption of orbital tissues. Normal palpebral fissure anatomy was also maintained. This approach was first described in the veterinary literature in 3 canine cases by McDonald et al (15) for a retrobulbar abscess, a mucoceole, and necrotizing sialadenitis. One patient in that case series had blindness as a long-term complication due to an undetermined etiology, and another patient had a superficial corneal ulceration which resolved uneventfully, similar to the present case. McDonald et al (15) hypothesized that blindness as a postoperative complication was localized to a preganglionic lesion with possible etiologies including optic nerve compression, postoperative inflammation associated with the optic nerve, or surgical manipulation. In that case, optic nerve compression seemed most likely based on the significant mass effect of the mucoceole, and did not appear to be attributable to surgery (15).

A ventral transpalpebral anterior orbitotomy facilitates exposure of the ventral orbital floor and is appropriate for lesions in a similar location described in this report, as well as those described in the 2016 McDonald et al (15) case series. Until now, this surgical approach has not been reported in the treatment of a neoplastic condition. This approach may not be appropriate for disease processes that are more extensive or infiltrative, or which require adequate access to the lateral or dorsal orbital regions. None of the reported cases to date, including the present case, utilizing this surgical approach has had a recurrence of orbital disease within their follow-up time frames (2 y for the retrobulbar abscess and mucoceole cases, and 2 mo for the necrotizing sialadenitis case) (15).

In the only other reported orbital lipoma in the veterinary literature, a trans-conjunctival approach was performed (14) which may have resulted in less orbital exposure than the transpalpebral approach described here. Avoiding the third eyelid and the associated lacrimal gland may be possible in both approaches; however, less manipulation of the third eyelid was expected with the transpalpebral approach. Additionally, leaving the lid margin architecture intact is of significant benefit, as alterations to the lid margins can interfere with tear film distribution and therefore corneal health (22). As this patient already had a

progressive corneal disease (pannus), decreasing the likelihood of additional corneal irritation was a priority. With the transpalpebral approach there was no need for conjunctival suture, which was used in the transconjunctival approach. Conjunctival suture can result in additional corneal irritation depending upon its placement. Minimal hemorrhage was encountered in the case using the transconjunctival orbitotomy (14) and this may be a benefit as compared to the transpalpebral approach.

McDonald et al (15) reported that exophthalmos and soft tissue orbital swelling resolved within 2 wk of surgery in all 3 cases. In the case presented here, exophthalmos did not resolve until 4 wk after surgery. Considerations for the longer duration of postoperative exophthalmos and soft tissue orbital swelling include the use of Surgifoam (Ethicon) in the retrobulbar space and a difference in postoperative anti-inflammatory medication. McDonald et al (15) administered oral prednisone after surgery (with initial doses ranging from 1.0 to 2.2 mg/kg BW per day) for anti-inflammatory purposes; whereas in our case, a non-steroidal anti-inflammatory drug (NSAID) was used to manage postoperative inflammation. Non-steroidal anti-inflammatory drugs are known to be less potent than corticosteroids with regard to their anti-inflammatory properties (23). Our decision to manage postoperative pain and inflammation with an NSAID was to avoid potential decreased wound healing time and to avoid side effects commonly associated with steroid administration. Meloxicam was a good option in this case as it has been shown efficacious for postoperative soft tissue analgesia and inflammation (24–27).

While the primary indication for Surgifoam, a porcine gelatin absorbable sponge frequently used in both human and veterinary surgery, is for hemostatic purposes, intra-operative hemorrhage in this case was controlled with electro-cautery and direct pressure. The Surgifoam that was inserted into the retrobulbar space was used to prevent postoperative enophthalmos, which likely contributed to moderate exophthalmos OS for several weeks after surgery; this exophthalmos was no more severe than what was present before surgery. The sponges are expected to be compressed and resorbed over 4 to 6 wk. In our case, it was expected that a near-normal appearance to the patient's orbit and globe would be achieved within that time frame. Porcine-derived hemostatic sponges have been determined to be safe for use in veterinary patients as persistent postoperative complications and hypersensitivity reactions, while reported in humans, do not appear to occur with any significant frequency in veterinary patients (28).

In the case herein, transient expansion of the Surgifoam was expected to potentially result in exophthalmos rather than impacting the retrobulbar tissues such as the optic nerve. This may be due to the anatomy of the canine orbit and the incomplete bony enclosure, allowing some degree of outward soft tissue expansion. However, this should still be recognized as a potential risk for using a hemostatic sponge in the retrobulbar area. Some degree of retraction of the orbital soft tissues was also expected in the later postoperative period due to fibrosis, which increased the concern for postoperative enophthalmos and supported our decision to leave the Surgifoam in the retrobulbar space at the time of surgery. This was in contrast to the report by Alander et al (29) to not leave Surgifoam in a confined space.

This case is the second report of an orbital lipoma in the veterinary literature, and the first report of a ventral transpalpebral orbitotomy for surgical treatment of a neoplastic process. This surgical approach should be considered in cases of focal, non-invasive retrobulbar disease and for acquiring incisional or narrow margin excisional biopsy which increases the likelihood of a definitive diagnosis. Fortunately, exenteration of the orbit and removal of a visual eye was avoided in this case owing to a thorough pre-operative diagnostic evaluation and application of this surgical approach. CVJ

References

1. Attali-Soussay K, Jegou JP, Clerc B. Retrobulbar tumors in dogs and cats: 25 cases. Vet Ophthalmol 2001;4:19–27.
2. Hendrix DVH, Gelatt KN. Diagnosis, treatment and outcome of orbital neoplasia in dogs: A retrospective study of 44 cases. J Small Anim Pract 2000;41:105–108.
3. Michelle Willis A, Wilkie DA. Ocular oncology. Clin Tech Small Anim Pract 2001;16:77–85.
4. Hendrick M. Mesenchymal tumors of the skin and soft tissues. In: Meuten D, ed. Tumors in Domestic Animals. 5th ed. Ames, Iowa: Wiley Blackwell, 2002:751–752.
5. Gelatt K. Essentials of Veterinary Ophthalmology. Ames, Iowa: Wiley Blackwell 2014:42–44.
6. Winer JN, Verstraete FJM, Cissell DD, et al. Clinical features and computed tomography findings are utilized to characterize retrobulbar disease in dogs. Front Vet Sci 2018;5:1–12.
7. Bedford P. Orbital pneumatosis as an unusual complication to enucleation. J Small Anim Pract 1979;20:551–555.
8. Gelatt KN, Plummer CE. Canine orbit. In: Color Atlas of Veterinary Ophthalmology. 2nd ed. Ames, Iowa: Wiley Blackwell, 2017:53–66.
9. Holloway A, Donaldson D, Kafarnik C. Imaging diagnosis-thrombosed orbital varix in a dog. Vet Radiol Ultrasound 2015;56:E58–64.
10. Adkins EA, Ward DA, Daniel GB, Wooten PT. Coil embolization of a congenital orbital varix in a dog. J Am Vet Med Assoc 2005;227:1952–1954.
11. Goldsmith M, Hendrick M. Tumors of the skin and soft tissues. In: Meuten D, ed. Tumors in Domestic Animals. Ames, Iowa: Blackwell, 2008:45–117.
12. McEntee MC, Thrall DE. Computed tomographic imaging of infiltrative lipoma in 22 dogs. Vet Radiol Ultrasound 2001;42:221–225.
13. Case JB, MacPhail CM, Withrow SJ. Anatomic distribution and clinical findings of intermuscular lipomas in 17 dogs (2005–2010). J Am Anim Hosp Assoc 2012;48:245–249.
14. Williams DL, Haggett E. Surgical removal of a canine orbital lipoma. J Small Anim Pract 2006;47:35–37.
15. McDonald JE, Knollinger AM, Dees DD. Ventral transpalpebral anterior orbitotomy: Surgical description and report of 3 cases. Vet Ophthalmol 2016;19:81–89.
16. Shields JA, Shields CL, Scartozzi R. Survey of 1264 patients with orbital tumors and simulating lesions: The 2002 Montgomery Lecture. Part 1. Ophthalmology 2004;111:997–1008.
17. Gould D. Diseases of the orbit. In: Maggs D, Miller P, Ofri R, eds. Slatter's Fundamentals of Veterinary Ophthalmology. 6th ed. St. Louis, Missouri: Elsevier, 2018:101–126.
18. Boydell P, Paterson S, Pike R. Orbital fat prolapse in the dog. J Small Anim Pract 1996;37:61–63.
19. Bedford PG, Barnett KC, Boydell P, Haizelden N. Partial prolapse of the antero-medial corpus adiposum in the horse. Equine Vet J Suppl 1990:2–4.
20. Ravi M, Schobert CS, Kiupel M, Dubielzig RR. Clinical, morphologic, and immunohistochemical features of canine orbital hibernomas. Vet Pathol 2014;51:563–568.
21. Stuckey JA, Rankin AJ, Romkes G, Slack J, Kiupel M, Dubielzig RR. Subconjunctival hibernoma in a dog. Vet Ophthalmol 2015;18:78–82.
22. Holly FJ, Lemp MA. Tear physiology and dry eyes. Surv Ophthalmol 1977;22:69–87.
23. Becker DE. Basic and clinical pharmacology of glucocorticosteroids. Anesth Prog 2013;60:25–32.

24. Gruet P, Seewald W, King J. Robenacoxib versus meloxicam for the management of pain and inflammation associated with soft tissue surgery in dogs: A randomized, non-inferiority clinical trial. BMC Vet Res 2013;9:92.
25. Mathews KA, Pettifer G, Foster R, McDonell W. Safety and efficacy of preoperative administration of meloxicam, compared with that of ketoprofen and butorphanol in dogs undergoing abdominal surgery. Am J Vet Res 2001;62:882–888.
26. Leece EA, Brearley JC, Harding EF. Comparison of carprofen and meloxicam for 72 hours following ovariohysterectomy in dogs. Vet Anaesth Analg 2005;32:184–192.
27. Mathews KA. Non-steroidal anti-inflammatory analgesics: A review of current practice. J Vet Emerg Crit Care 2002;12:89–97.
28. Charlesworth TM, Agthe P, Moores A, Anderson DM. The use of haemostatic gelatin sponges in veterinary surgery. J Small Anim Pract 2012;53:51–56.
29. Alander DH, Shannon Stauffer E. Gelfoam-induced acute quadriparesis after cervical decompression and fusion. Spine (Phila Pa 1976) 1995; 20:970–971.

Answers to Quiz Corner
Les réponses du test éclair

1. **E)** Amphotericin B is nephrotoxic. It is directly toxic to the renal tubular epithelium and causes renal vasoconstriction, decreasing the glomerular filtration rate. Patients need intravenous fluid diuresis before the administration of amphotericin B.

E) L'amphotéricine B est néphrotoxique. Elle est directement toxique pour l'épithélium tubulaire rénal et elle cause une vasoconstriction rénale, ce qui diminue le débit de filtration glomérulaire. Les patients ont besoin d'une fluidothérapie intraveineuse diurétique avant l'administration d'amphotéricine B.

2. **B)** A pressure of less than 15 mmHg is considered hypotony, and a pressure greater than 25 mmHg is not consistent with normal function of the optic nerve.

B) Une pression inférieure à 15 mmHg est considérée comme une hypotonie, et une pression supérieure à 25 mmHg n'est pas compatible avec la fonction normale du nerf optique.

3. **C)** *Campylobacter* enteritis is very common and these organisms can also be animal pathogens. Although the mechanisms for the development of Guillain-Barré Syndrome are not fully understood, and the syndrome can be triggered by a variety of associations, the relationship to campylobacteriosis is medically acknowledged.

C) L'entérite à *Campylobacter* est très commune et cet organisme peut également être pathogène pour les animaux. Bien que les mécanismes pour le développement du syndrome de Guillain-Barré ne soient pas complètement connus et que le syndrome puisse être déclenché par diverses associations, la relation avec la campylobactériose est médicalement reconnue.

4. **C)** The dexamethasone suppression test is the test of choice for diagnosis of pars intermedia dysfunction.

C) Le test de suppression par la dexaméthasone est le test de prédilection pour le diagnostic de la dysfonction du lobe intermédiaire de l'hypophyse.

5. **E)** Although all can cause subcutaneous emphysema, escape of intraperitoneal free air after a standing flank laparotomy is common if the peritoneal closure is imperfect. It presents with no other signs, and usually resolves without complications.

E) Bien que tous les problèmes énumérés puissent causer de l'emphysème sous-cutané, la libération de l'air libre intrapéritonéal après une laparotomie par le flanc en position debout est fréquente si la fermeture de l'incision péritonéale est imparfaite. Cette libération d'air se présente sans autres signes et disparaît habituellement sans complications.