



Long Island Veterinary Specialists

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SEPT/OCT 2021 VOLUME 14 - ISSUE 5

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What's your diagnosis?

John S. Sapienza, DVM DACVO



"Frosty," a 6-year-old spayed female dog had cataract surgery years ago at an unknown facility, and she now arrives with the following clinical presentation (photograph included). There are 2 apparent scars at the limbus, the pupil is irregular and there appears to be something circular behind the pupil. What is going on with this patient? Is there a significant threat to vision? Is the eye comfortable? Should we enucleate the eye?

Let's take a closer look at the photograph. There are faint linear scars near the dorsal limbus at the 1:00 and 11 o'clock positions. These are the primary incision entry wounds for the phacoemulsification surgery and are perfectly placed. This is not an issue. The pupil is irregular in shape and drawn towards the 11:00 position.

What do we call this irregularly shaped pupil? Dyscoria is the word for a misshaped pupil. In this case, the dyscoria is present due to vitreous coming through the pupil up to the primary incision. This vitreal entrapment is causing the pupil to be deformed. Is this an issue? This vitreal prolapse and entrapment usually is not an issue with vision, although chronic uveitis may persist due to "chaffing" on the iris. Vision, in theory, may be slightly abnormal due to the lack of normal pupillary movement. The vitreal incarceration into the primary incision may be an issue with leakage of aqueous humor initially after the surgery or the introduction of bacteria into the anterior chamber. Fortunately, this is a low occurrence phenomenon in our post-operative canine eyes. The pupil may also be irregularly oriented towards the peripheral iris base due to an anterior synechiae formation. Anterior synechiae, is focal, leads to minimal issues with regards to sight and prolonged uveitis. The anterior synechiae, if broad-based, may lead to angle closure glaucoma in some extreme cases. What is the circular object behind the pupil? This object is the intraocular lens implant. The goal of routine cataract surgery is to remove the cataract and to insert an intraocular lens (IOL) implant. The IOL helps the eye to achieve emmetropia-or true vision. The IOL is well centered in this patient, and the fundus evaluation was normal for this dog. There is minimal capsular opacification as a sign of good capsular polishing by the surgeon.

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A NOTE FROM THE EDITOR



An account of some sad events was reported in Newsday recently when a dog fighting ring was uncovered in Suffolk County. Dogs were tortured, trained to fight to the death and killed for sport, as the DA announced after the takedown of the largest dog-fighting operation in county history. The network operated from Suffolk's East End through Nassau, Brooklyn and into Connecticut and Massachusetts; 89 dogs were seized, predominantly pit bulls, which were kept in "inhumane" conditions and raised from birth to fight. Dogs that failed in battle were killed. The only thing the defendants cared about was money and their own personal status in this abominable underground network. Good to hear it was stopped. An opposite tale of compassion for pets came about when a former British Marine who had been stationed in Afghanistan, was credited with a mission to save almost 200 dogs and cats from abandonment there during the recent pull-out. His group of volunteers chartered two aircraft to get them out; still there was much delay as the dogs were baking in the heat in cages before the Taliban released them. They were flown to the UK.

Early in the COVID pandemic, zoo animals contracted the virus. First, tigers and lions at the Bronx Zoo in April 2020; later at the San Diego Zoo. In June 2021, two lions died at a zoo in India after testing positive for COVID-19. At the Oakland Zoo, in California, 48 animals including hyenas, chimpanzees, and mountain lions -have received at least one dose of an experimental COVID-19 vaccine made exclusively for animals. Half are already fully vaccinated and dozens of zoos, research institutions, and sanctuaries have requested the vaccines from veterinary pharmaceutical company Zoetis which has some 11,000 doses of the animal vaccine to give to more than 80 institutions in 27 states for free. It's a promising development for zoo animals, which are at risk of the disease because of their proximity to humans. Much remains unknown. How effective will the vaccines be? Will they protect animals against the Delta variant and will household pets ever need to be vaccinated? Seems likely the animals caught the virus from humans, yet no guidelines for separating pets from their owners are being issued. A vaccine is in trials, developed by a biotech company in Stony Brook for use in felines with encouraging results. Transmission of the virus has only been documented going from humans to cats, not the other way.

At LIVS, construction is moving ahead and many of the new administrative offices are being settled into; the original areas being turned over to examining rooms and enlargement of the OR suites and prep areas. The façade on the eastern side is complete and the side facing the LIE is progressing as well.

Our summer externship program has been completed with positions filled by students from schools including LSU, UMass, Cornell, Auburn, Tufts and U of Penn. They enjoyed an authentic and real world experience that will serve them well in their futures. Externs were able to execute a schedule that addressed their needs and met their goals. It was rewarding for them and for LIVS. We expect the fall group will participate in a profitable experience as well. Our own family has felt an unfortunate sadness in the last few months as our bunny Bruno and our St. Bernards, both Enzo and his older brother Duke were humanely euthanized. We all remember our pets with the fondness and love we shared in this life and look forward eventually to the "Rainbow Bridge."

All our departments remain fully staffed to serve our patients all hours of every day and night. Consultations and appointments can be made by calling (516) 501-1700. As before we welcome all comments, please submit them to <u>Imarino@livs.org</u>.

-Leonard J. Marino, MD, FAAP, LVT





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Jonathan Goodwin, DVM, MS DACVIM (Cardiology) *Cardiology*



Joshua W. Tumulty, DVM DACVIM (Internal Medicine) Internal Medicine, Radioiodine Therapy



Kay Kim, VMD DACVO **Ophthalmology**



Michael Larkin, DVM DACVS-SA Surgery, Neurosurgery



Shadi Ireifej, DVM DACVS Director, Emergency Services



Neil Mittelman, DVM DACVIM (LAIM;Neurology) Neurology/Neurosurgery



John S. Sapienza, DVM DACVO **Ophthalmology**



Catherine A. Loughin, DVM DACVS, DACCT *Surgery, Neurosurgery*

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Michel Selmer, MS, DVM CTCVMP Integrative Medicine



Patrick F. Roynard, DVM, MRVCS DACVIM (Neurology) Neurology/Neurosurgery



Kevin Barber, DVM Surgery Clinician Surgery, Neurosurgery



Dominic J. Marino, DVM DACVS, DACCT, CCRP Surgery, Neurosurgery, Radiation Therapy, Physical Rehabilitation



Kimberly Golden, DVM Internal Medicine Clinician Internal Medicine



Nicole Leibman, DVM DACVIM (Oncology) Oncology, Radiation Therapy



Jaclyn Holdsworth, DVM Surgery Clinician *Surgery, Neurosurgery*



Robert Waddell, DVM DACVS-SA Surgery, Neurosurgery



Long Island Veterinary Specialists 163 South Service Road Plainview, NY 11803 Ph: 516-501-1700 | Fax: 516-501-1169 livs.org



What's your diagnosis?

Continued from Front Cover

When there is vitreal prolapse into the anterior chamber, which is quite common in our small animal patients even without gross evidence of lens (sub)luxation, the surgeon's duty is to remove those offending vitreal strands. Typically, I inject triamcinolone (Triesence®) into the anterior chamber to highlight the vitreal strands. Then, a vitreal cutter (vitrectomy probe) is placed into the anterior chamber, and the highlighted vitreal strands are easily removed from the eye. In addition, I inject carbachol (a miotic agent) at the end of surgery to induce miosis and to prevent any post-operative pressure spikes. The miosis helps to see if the constricting pupil is entrapped by any vitreal material. If so, at the end of surgery, I can perform more vitrectomy or simply swipe the incision free of any vitreal strands. The best way to minimize a dyscoric pupil due to entrapped vitreous is to address the vitreal strands at the time of surgery. To go back into the eye after any intraocular surgery is rarely a favorable situation.

In conclusion, vitreal prolapse is common in small animal ophthalmology, can be dealt with easily at the time of surgery, and even if occurs, rarely causes long-term issues with healing and vision. Despite an irregular pupil this patient went on to many years of excellent postoperative vision. Any questions/concerns, please do not hesitate to contact us.



There are faint linear scars near the dorsal limbus at the 1:00 and 11 o'clock positions. These are the primary incision entry wounds for the phacoemulsification surgery and are perfectly placed. This is not an issue. The pupil is irregular in shape and drawn towards the 11:00 position.

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Prophylactic and Emergency Gastropexy

Brian Adams, DVM, DACVPM, Emergency Clinician



A Gastropexy is a procedure to create a permanent adhesion between the pyloric antrum and the adjacent right body wall. A prophylactic gastropexy is an elective surgery to prevent the occurrence of gastric dilatation volvulus. Gastric dilatation volvulus (GDV) is a life-threatening syndrome reported most commonly in large-breed, deepchested dogs in which the stomach rotates on its axis, trapping air within its lumen. This rotation subsequently leads to portal hypertension, systemic hypotension, cardiogenic shock and death if left untreated. Breeds at highest risk include Great Danes, Gordon Setters, Irish Setters, Weimaraners, Saint Bernards, Standard Poodles, and Bassett Hounds.

If a canine has not had a gastropexy, the following are signs associated with GDV. It is common to see abdominal distension (figure 1), unproductive vomiting or retching, restlessness and hypersalivation. Depending on the duration and severity a canine may be either in a compensatory or decompensatory state of shock. While in compensatory shock there may be injected mucus membranes, an increased heart rate and weak pulses. As the animal transitions into decompensatory shock the mucus membranes become pale, the heart rate slows, the extremities will become cold, mentation is depressed, and hypothermia may be present. In the majority of cases abdominal distention with tympany is present. A palpable splenomegaly may be present due to venous outflow obstruction.

Diagnostics such as abdominal radiographs, complete blood count, biochemistry, and plasma lactate are helpful in reaching a diagnosis. A right lateral abdominal radiograph will reveal a pathognomonic "double bubble" or "Popeye sign" if GDV is present (Figure 2). If air is seen within the peritoneum it could indicate a perforated stomach. If the stomach was decompressed by trocar this could also lead to air within the peritoneum. The complete blood count may reveal evidence of hemoconcentration and a stress leukogram. Elevations in Alanine transaminase (ALT) and total bilirubin are associated with hepatocellular damage likely secondary to hypoxia and biliary stasis. Elevations in blood urea nitrogen and creatinine could be due to hypotension. Different electrolyte imbalances typically resolve after correcting the GDV and fluid therapy. Plasma lactate is a helpful diagnostic for assessing perfusion, monitoring resuscitation efforts and possibly predicting survival. Different studies have concluded when there is likely gastric necrosis when the initial plasma lactate is greater than 6.0-7.4 mmol/L. Another study demonstrated the survivability was 90% if initial lactate was below 9.0mmol/L as compared to 54% if the lactate was 9.0mmol/L or higher. It is most important to observe the trend of the plasma lactate; as there is overlap from different studies for cutoff of survivors and nonsurvivors.

Stabilizing the patient is the first step once a GDV is diagnosed. Fluid therapy is the most important component and is aimed at combating hypotension. A minimum of two large bore catheters should be placed in either the cephalic or jugular veins. As the GDV is occluding venous return from the caudal vena cava, saphenous veins would be inappropriate catheterization site. Fluid goals are rapid expansion of intravascular volume, maintaining that volume over time, and allowing hydration at the cellular level. Flow by oxygen is helpful to maintain oxygen saturation, and broad spectrum antibiotics should be initiated for possible bacterial translocation. Once the patient is stabilized with fluids, it is appropriate to decompress the stomach.

The preferred method is by passing an orogastric tube over trocarization. The orogastric tube allows rapid decompression and does not involve placing a sharp object in a stomach with potential necrosis. Before passing an orogastric tube, measure from the nares to the caudal edge of that last rib. Care should be taken to protect the airway, and intubation maybe warranted. There will be resistance at the distal esophagus due to the volvulus. If passing the orogastric tube is unsuccessful, a large bore needle or trocar can be placed percutaneously over the area with the greatest tympany after the site is clipped and prepped. After decompression, the patient could be transported to a surgical center.

The lifetime risk for dogs predisposed to development of gastric dilatation volvulus has been estimated to be between 4% and 37%. In one study of dogs at risk for development of gastric dilatation volvulus, dogs that underwent prophylactic gastropexy had a 29-fold decrease in mortality rate compared with dogs that had not undergone gastropexy. If a dog develops GDV, a gastropexy can be performed at the end of surgical intervention before closing the abdomen. Recurrence of GDV in dogs that did not receive a gastropexy has been reported as high as 85%. Median survival times in dogs that experienced GDV and were treated without a gastropexy is 188 days compared to 547 days for dogs treated with a gastropexy at the time of GDV.

There are varying opinions as to the most appropriate time to prophylactically gastropexy a dog. Some surgeons advocated waiting until the canine is done growing versus other surgeons that are believe it is acceptable what at least six months old. It would then be possible to spay and gastropexy during the same procedure as long as the female canine was over six months of age. Performing both at the same time would not be possible if the intent is to spay prior to the first estrus cycle and perform the gastropexy after reaching skeletal maturity in the larger or giant breed canines. Therefore you should make your own conclusions as to when a canine old enough to have a prophylactic gastropexy.

Prophylactic and Emergency Gastropexy

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Multiple approaches have been described to perform a prophylactic gastropexy. At Long Island Veterinary Specialists, we will typically perform the incisional or the laparoscopic assisted gastropexy. The incisional gastropexy can readily be performed as an additional procedure if a laparotomy is already planned. The laparoscopic assisted is a minimally invasive technique if a laparotomy is not indicated for a different procedure. Several biomechanical studies have been conducted to test the strength of the gastropexy; the incisional and laparoscopic techniques have comparable biomechanical strength.

Following surgery the complications are variable depending if this was a prophylactic procedure or performed following a GDV. For prophylactic procedures the most common complication is inflammation or dehiscence of the skin incision. This is greatly reduced if the animal has proper activity restriction and is not able to lick at the incision. Complications following an emergency GDV include peritonitis, sepsis, disseminated intravascular coagulation, ileus and vomiting. Typically these patients are hospitalized for 3-4 days. A gastropexy after the GDV is corrected doesn't add additional complications.

The prophylactic gastropexy is an important consideration for the care of at risk breeds. One study demonstrated a 29-fold decrease in mortality rate for at risk breeds that received a gastropexy compared to at risk breeds that did not. If an animal develops GDV prompt stabilization and emergency surgery is critical. A gastropexy is highly encouraged following a GDV as the recurrence rates are as high at 85%.



Figure 1: Dog with distended abdomen



Figure 2: Right lateral abdominal radiograph



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Dominic J. Marino, DVM Dip. ACVS, Dip. ACCT, CCRP

Dr. Dominic J. Marino is one of the most experienced hip replacement surgeons in the country. He has performed over 2,000 THR procedures, in dogs, cats, and pot-bellied pigs. His areas of special interest include joint replacement surgery, brain surgery, and spine surgery. Dr. Marino has lectured nationally and internationally on these subjects.

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Management of recurrent and prolonged seizures: terminology & pathophysiology, cluster seizures (CS), status epilepticus (SE) and refractory status epilepticus (RSE) | Part 2: Cluster Seizures

Patrick Roynard, DVM, MRCVS, DACVIM, (Neurology/Neurosurgery)



<u>Recurrent and/or prolonged seizures –</u> <u>Cluster seizures (CS)</u>

The term cluster seizures (CS) refers to multiple generalized (tonic, clonic or tonic-clonic) or focal seizures (with or without secondary generalization) within a 24-hour period. The terms acute repetitive seizures and serial seizures are synonymous. Repetitive seizures imply increased excitation and/or impaired mechanisms of normal seizure termination and refractoriness. It has been shown that seizures occurring within less than 8hrs from one another are more likely to arise from the same focus of the cerebral cortex than if further apart in time, and CS are frequently encountered in cases of structural epilepsy (e.g. brain tumor).

- Epidemiology of CS

CS are unfortunately frequent in canine epilepsy. Monteiro et al. (2012) reported in a study of 407 dogs that 47% of dogs with idiopathic epilepsy (IE) experienced CS at least once in their epilepsy history. Certain breeds also seem to show predisposition to CS such as: German Shepherds, Boxers, Border Collies, and Australian Shepherds. Border Collies with confirmed IE are reported to have occurrences of CS in 94% of the cases. Australian Shepherds with IE diagnosed before 5 years of age are reported to suffer from CS and/or SE in 80% of the cases, with almost half of the population suffering from both.

Gender and neuter status also have an influence on the occurrence of CS. It has been shown that females suffer CS more often than males do, and that intact dogs are 1.4 times more likely than neutered dogs to suffer CS (with the trend being present also in both genders considered separately).

- Treatment of CS

The management of CS involves treatment of ongoing seizures, active prevention of future ones, and management of co-morbidities. In an episode of CS, any ongoing seizure activity should be treated, but a daily AEM should also be started (e.g. Levetiracetam, Phenobarbital). It is not satisfactory to limit CS management to repetitive use of benzodiazepines such as Diazepam. Figure 2 displays a proposed step-by-step algorithm for treatment and management of CS in hospital.

Treatment of seizures:

 <u>Benzodiazepines</u>: As for the treatment of any seizure activity in an emergency setting, benzodiazepines are the first-line therapy for CS due to their fast-acting and effectiveness in terminating seizure event. In the context of CS, they can be used to terminate an ictal event or reduce the likelihood of further ones occurring.

- To terminate ictal event
 - At home, management by the owners can involve the use of rectal diazepam suppository at 0.5-1 mg/kg, with the higher dosage being required for dogs chronically treated with Phenobarbital (due to reduced benzodiazepines serum level in dogs chronically treated with Phenobarbital). Recently, intranasal midazolam administered through an atomizer has become the gold standard, due to higher and faster efficacy in seizure termination than rectal diazepam.
 - In the hospital, emergency seizure termination can be achieved with DZ 0.5-1mg/kg IV or MZ 0.2-0.5mg/kg IM/IV.
- <u>To reduce further seizures</u>

Clorazepate is a benzodiazepine prodrug converted in nordiazepam (active metabolite) after oral administration, with serum elimination half-life in dogs of 3-6hrs. It can be used at home or in the hospital, as early as right after the first seizure for dogs with tendency to present CS. Recommended dosage is 0.5-2mg/kg PO q6hrs for 24hrs, starting as soon as the dog is able to safely swallow medication after the first seizure. The owners should be made aware that sedation is an expected effect of this medication and animals should be monitored accordingly (e.g. recommend keeping them away from stairs). As for other benzodiazepines, higher dosage may be required in dogs chronically treated with Phenobarbital.

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- Other medications:
 - Levetiracetam (LEV): LEV is an antiepileptic medication that can be used safely in dogs and cats, both PO and/or IV. The half-life in dogs is short, approximately 2-4hrs, making this medication ideal for emergency setting. A clinical study in dogs with CS or SE also showed synergistic effect of using LEV in addition to DZ compared to DZ only.
 - In the hospital, a loading dose of 60mg/kg IV can be administered to achieve therapeutic levels. A maintenance dose of 20-30mg/kg PO or IV q8hrs is recommended afterwards. This protocol, due to its practicality of use and relatively low side effects associated, is an easy way to start and maintain a patient on a first AEM in the context of CS.
 - At home, LEV can be used orally at a starting dose of 20-30mg/kg PO q8hrs. For patients already treated daily with LEV, administration can be increased to q6hrs to create a temporary increase in serum blood level. For patients not on this medication before cluster, it can also be used as a pulsatile therapy (e.g.5-7 days on following cluster, then wean-off if no further seizures nor prior cluster history).
 - Phenobarbital (PB): PB can be used IV in 0 the context of CS, to load an animal or temporarily increase the serum blood level of an animal previously on PB. PB can be administered IV as a bolus of up to 16mg/kg IV to achieve therapeutic range, however such a large dose at once is associated with severe sedation and side effects, potentially triggering recumbency for several days in older patients. An alternative use is the administration of several 4mg/kg IV bolus g6hrs over 12-24hrs, prior to a maintenance dose of 2.5-4mg/kg PO or IV q12hrs.

Ideally, PB side effects of paresis, altered mentation (explained in lay terms to the owners as "goofiness"), increased thirst and polyphagia, should be discussed with the owners prior to use.

 Other AEMs, such as Pregabalin, Zonisamide, Felbamate and Potassium Bromide can be used during CS. However, their lack of IV formulation renders them relatively less practical to use in the context of CS than the medications previously discussed.

Treatment of comorbidities:

During CS, several comorbidities not classically encountered in cases of isolated seizures can develop.

- <u>Respiratory complications:</u> Dogs presenting with CS of tonic-clonic generalized seizures or focal seizures involving excessive ptyalism are at risk of developing pneumonia in the few days following the CS event. Accordingly, their respiratory rate, pattern, and temperature should be monitored during and following CS. Because a patient is stable respiratory-wise at time of admission to the hospital is not a guarantee that this patient will not decompensate later, and careful monitoring with regular spO2 measurement is recommended (specifically for brachycephalic breeds, see Figure 3). Respiratory complications are likely to delay further diagnostic assessment of the seizure disorder, and should be treated in priority as they can decompensate quickly and engage the patient's vital prognosis.
- <u>Mental status/brain edema</u>: Mental status is likely to be affected during a CS event, either temporarily as a result of the seizures themselves (e.g. post-ictal state, brain edema) or more permanently due to an intracranial pathology in cases of structural epilepsy, frequent in cases of CS.

The administration of Mannitol 1 gram/kg IV over 20-30 minutes and/or Dexamethasone 0.1mg/kg IV can be considered to help reduce post-ictal and vasogenic edema. This can be repeated q12-24hrs during the CS event if required.

 In cases of severe, repetitive and/or prolonged seizure activity, electrolytes abnormality and hypoglycemia can develop and should be monitored and corrected if required.

- Prognosis of CS

The impact of episodes of CS on the management of epilepsy is significant: aside of the direct danger to patient's safety during episodes of CS, medical complications associated with CS can be lifethreatening to the patient (e.g. aspiration pneumonia), also the repeated cost of hospitalization in an intensive care unit (ICU) and emotional burden on owners are likely to lead to euthanasia. Euthanasia was associated with a high frequency of CS episodes in a study by Monteiro et al. in 2012, and dogs with CS have been found to have lower average prognosis than dogs without CS in canine epilepsy studies.

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Figure 2: Proposed algorithm for step-by-step management of CS in hospital.



Figure 2: 3: Brachycephalic breeds are specifically at risk of respiratory complications following seizures. For animals presenting excessive ptyalism, suction can be used to try and prevent airway contamination. Thoracic radiographs should be considered for patients presenting dyspnea, increased respiratory effort and/or fever. Oxygen supplementation should be implemented early (e.g. nasal probes can be placed following the sedation obtained after administration of IV diazepam for seizure).

Parts 3, and 4 will address respectively status epilepticus (SE) and refractory statusepilepticus (RSE).



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