VRCC®
VETERINARY SPECIALTY & EMERGENCY HOSPITAL

3550 South Jason Street
Englewood, CO 80110
(303) 874-PETS (7387)
www.vrcc.com

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SUMMER 2022 NEWSLETTER

SUMMER IN COLORADO IS HERE!

Summer is officially here and we are ready! This summer edition of our newsletter highlights our Emergency, Cardiology, and Surgery teams as well as upcoming events and news.

Our Cardiology department shares information about their practice, and what they offer for clients & patients in the Practice Highlight on this page.

VRCC Surgery introduces our new Surgeon, Dr. Kristin Freund in the staff highlight section, just to the right on this page.

Our case study for this issue is presented by, Angela Secchi, CVT. Angela is one of our Emergency technicians. She discusses a retrospective study on a patient with tetanus that she helped care for during her time at Wisconsin Veterinary Referral Center.

Be sure to check out the VRCC news and announcements section. We announce our Fall DVM CE date and introduce our new VRCC doctors!

We hope you have a fun-filled and exciting Summer!

Your VRCC Team

PRACTICE HIGHLIGHT: VRCC CARDIOLOGY

There are lots of new developments for VRCC Cardiology! Firstly, the northern branch (Rocky Mountain Veterinary Cardiology) has moved from Boulder to Longmont. Here is the phone number and address for the Longmont branch: 303-927-6928, 104 S Main St, Longmont, CO 80501. Appointments are available Monday-Friday.

VRCC Cardiology is now performing interventional/minimally invasive procedures here at VRCC! Currently, the primary focus is on interventional closure of patent ductus arteriosus (PDA), pulmonic stenosis balloon valvuloplasty, and pacemaker implantation. However, we are open to performing other interventional procedures as well. If you have a unique case, give us a call!

Finally, we have a new cardiology resident coming! Dr. Erika Pugh will be starting her residency on July 18. Dr. Pugh is originally from New Brunswick, Canada. She completed her veterinary school at the Atlantic Veterinary College in Prince Edward Island and then completed a small animal rotating internship at Ontario Veterinary College in Guelph. She will be finishing her cardiology specialty internship at Mississauga Oakville Veterinary Emergency Hospital in Oakville, Ontario prior to starting here. We are thrilled to welcome Erika to the VRCC Cardiology Family!

VRCC Cardiology can be reached at 303-874-2094, or cardio@vrcc.com.

STAFF HIGHLIGHT: VRCC SURGERY

Kristin Freund, DVM
Diplomate ACVS-SA

Dr. Kristin Freund was born in Fort Collins, Colorado but spent much of her youth moving around the country with her family. She returned to Colorado in 2006 to attend Colorado State University, where she earned her B.S. in Biomedical Sciences, followed by her DVM (go Rams!). Dr. Freund then completed an additional five years of training, including an internship at Cornell University and a surgical residency at the University of Georgia. Dr. Freund has since been practicing in the Colorado area. She joined the VRCC Surgery team in late May of this year and is excited to help you, your clients, and patients.

Dr. Freund's goal is to provide personalized and dedicated care for your patient's orthopedic, oncologic, and soft tissue surgical needs. Dr. Freund recognizes that every patient and their family is unique. She encourages teamwork in the approach to patient care, extending from the home to the hospital. Postoperative care for can be intimidating at first for some families. However, Dr. Freund and the surgery team at VRCC are here to help our furry friends along the road to recovery.

In her free time, Dr. Freund loves hiking with her long-haired mini dachshunds, Cannoli and Alfredo, snowboarding, traveling, yoga, and enjoying Colorado's craft brewery and culinary scenes.

VRCC Surgery can be reached at 303-874-2073, or surgery@vrcc.com.

CASE STUDY: EMERGENCY

Angela Secchi, CVT

VRCC Emergency & Critical Care

A Single Retrospective Case Study in Nursing Care for a Tetanus Patient

SIGNALMENT:
Xena, 2y, SF, Cane Corso, 34.7kg

HISTORY:
Xena presented to Wiconsin Veterinary Referral Center's (WVRC) ER department on 3/27/2018 for further care of progressive pain and inability to open her mouth.

3/23 Xena developed facial changes; wrinkling of the forehead and difficulty opening her mouth, 3/25 Xena stopped eating and drinking, 3/27 she was hypersalivating and needed assistance walking. That morning her owners took her to a local ER for baseline blood work (WNL) and sedated oral exam. The DVM was unable to open her mouth after sedation and recommended transfer for evaluation by a neurologist.

PHYSICAL EXAM:
On presentation Xena's forehead was wrinkled, her lips were held back, and she was exhibiting signs of trismus, also known as lockjaw. Creatinine kinase and masticatory muscle myositis (MMM) testing were performed.

Xena shortly after presentation

MMM is an autoimmune disorder resulting in autoantibodies attacking muscles of mastication. CK testing is a marker for muscular disease; both were normal. With MMM ruled out, the other differential was tetanus.

INITIAL CARE:
She was given a fentanyl bolus to facilitate NGT placement. IV fluids, a fentanyl CRI, and a Clinicare CRI were started. Penicillin G is recommended for tetanus treatment; Unasyn was chosen as it provides the same anaerobic coverage. Equine tetanus antitoxin was obtained and a test dose was given SQ. After 30 minutes no signs were noted so her full dose was given.

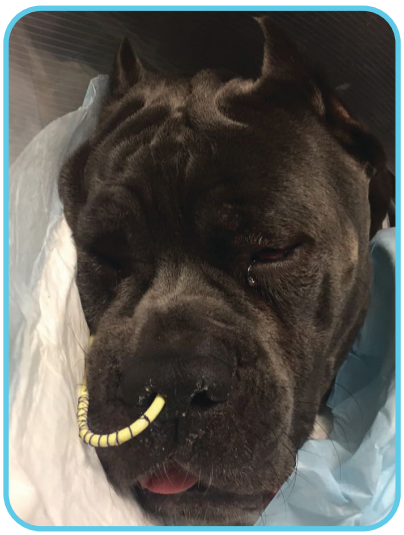
Tetanus is spread by anaerobic, spore-forming, bacillus Clostridium tetani. C. tetani secretes two exotoxins: tetanospasmin and tetanolysin. The latter locally harms tissue, while the former produces clinical signs. Tetanospasmin enters axons of nearby motor neurons and ascends towards the spinal cord then continues up to the CNS. As it ascends, it inhibits the release of glycine and GABA resulting in loss of inhibitory control.

Tetanus antitoxin neutralizes unbound toxin, it is not effective against toxin already bound. The main side effect is anaphylaxis. Bound toxin is irreversible. Recovery requires growth of new nerve terminals. Currently treatment is to administer antitoxin at the onset of disease despite studies showing no difference in prognosis if they don't receive antitoxin.

CONTINUED CARE:
On 3/28, metronidazole was added to her treatments due to its bactericidal activity against obligate anaerobes. It distributes well to tissues including the CNS and can build therapeutic levels in anaerobic tissues. She developed a respiratory effort with occasional tachypnea. Radiographic views

of the thorax were interpreted as potential recumbency atelectasis; however, early aspiration could not be excluded. Xena continued to hypersalivate with increasing stridor, likely secondary to saliva she wasn't swallowing.

That evening, she was moved from to the cat ward to decrease stimulation. During handling she experienced sustained muscular contractions. Diazepam IV was administered as it depresses subcortical levels of the CNS to produce muscle relaxation and sedation. There is postulation that it increases the release of GABA thereby allowing for inhibitory muscle control.



Xena after diazepam administration

Methocarbamol was given via her NGT. Methocarbamol is effective in treating muscle tremors, but has no direct effects on striated muscle, nerve fibers, or motor endplates. Its use for tetanus treatment is questionable. Both medications were followed by acepromazine IV as it depresses nerve function thereby decreasing hyperexcitable states that lead to sustained muscle contractions. The combination of benzodiazepines and phenothiazines

CASE STUDY: EMERGENCY (CONT'D)

are considered best for providing control over excitability and muscle spasticity.

On 3/29 the neurologist exam revealed absent CPs, absent hop, and decreased to absent withdrawal reflexes in both hindlimb. She recommended a diazepam CRI, acepromazine as needed, and to continue her metronidazole. Methocarbamol and fentanyl were discontinued. Her lung sounds progressed to bilateral harsh rales and nebulization was added. I set up Xena on telemetry to monitor vitals closely without handling. Shortly after starting the CRI her symptoms mildly dissipated: facial wrinkles were no longer tauter, ears dropped and she began sleeping.

~1 a.m. 3/30 Xena experienced a protracted muscular spasm episode. Her temperature read >109.0F for several minutes. Acepromazine was administered, external cooling efforts were applied, a cold water enema was performed, and a bolus of IVF's were given. Her temperature normalized. Bloodwork after showed BG 64 mg/dL (ref: 74-145 mg/dL). A dextrose bolus was administered and CRI started. Three hours later she experienced another episode, followed by more. Xena's owners were contacted and the concern for her QOL discussed with her owners electing for humane euthanasia.

CASE DISCUSSION:
Treatment for tetanus is straightforward with the use of antitoxin, antibiotics, and polypharmacy to control muscular spasticity and patient anxiety. These patients require close nursing care and it is vital to understand treatment is alleviating symptoms, not treating the disease directly. Patients often do not present with apparent wounds, and this was present in Xena's case. Xena's decompensation is a common set back. Sustained muscular contractions lead to hyperthermia, which leads to autonomic dysfunction resulting in a myriad of compounding signs that end with death. Retroactively, walking her likely added stress to her condition and provoked her final episodes of muscular hypertonicity. Interestingly enough, a prior patient of WVRC diagnosed with tetanus in 2012 did experience full rigor, but discharged after two weeks. The difference in cases underscores how extreme prognosis and mortality rates are (often reported as low as 50%, and as high as 92%).

This case study has been edited for brevity. For the full article with references, or if you have any questions about this case study, please contact Angela via email: asecchi@vrcc.com.

VRCC NEWS & ANNOUNCEMENTS

- We would like to welcome Dr. Lauren Barber to the VRCC Emergency team of doctors! Dr. Barber joined us at the end of April and we are thrilled to have her on board!
- We also have new specialists joining the VRCC family in the coming months! Dr. Vibha Asokan, DVM, MS, DACVECC will be joining our Critical Care team in July; Dr. Heidi Fink, DVM, MS, DACVIM will be joining VRCC Internal Medicine in July; and in September, we will be welcoming Dr. Taylor Graville, DVM, Practice Limited to Surgery to our team of surgeons!
- Quick construction update: Phase 1 (Radiation Oncology portion) of our new building will be completed this Fall. Phase 2 will be underway soon after, with projected completion next year.
- In an effort to reduce paper usage, we will be sending 1 physical copy of the VRCC quarterly newsletter to each hospital. If you would still like your own physical copy, please let Ruby Post, our Referral Liaison, know (303-874-2053 or rpost@vrcc.com). We will continue to send them digitally as well. To confirm you're on our email list, send a message to Ruby (rpost@vrcc.com)!
- VRCC's Fall DVM CE, "A Night With the Specialists" is set for the evening of Wednesday, October 5th. This CE will be open to 150 DVMs on a first come-first served basis. This seminar will provide 3.0 hours of CE for doctors. Registration will open in September. Keep an eye out in your inbox for more details on location, presentation topics, and how to get registered for this event!