



VIRGINIA-MARYLAND VETERINARY NOTES

Veterinary Teaching Hospital, Virginia-Maryland Regional College of Veterinary Medicine

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Thought of the Month

The way I see it, if you want the rainbow you have to put up with the rain.
Dolly Parton

Kent C. Roberts, DVM
Extension Veterinarian



VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Nasal Oxygen Insufflation

This newsletter is published quarterly in support of the outreach program of the Veterinary Teaching Hospital VMRCVM, Blacksburg, VA and is prepared for and distributed to veterinarians in the Mid Atlantic Region

Oxygen supplementation is an underutilized but very valuable part of supportive care for the critically ill patient. Examples of common clinical situations in which oxygen supplementation may be of benefit include dyspnea, seizures, congestive heart failure head trauma sepsis, pulmonary contusions pulmonary thromboembolism and pulmonary hypertension. Nasal oxygen supplementation has the advantage over other supplementation techniques in that it is easy, requires no specialized equipment, and allows close monitoring of the patient.

Various techniques of oxygen supplementation have been described in the dog and cat. One very useful technique is nasal oxygen insufflation. This procedure can be utilized in both dogs and cats. It involves placing a catheter in the nasal cavity and providing a humidified oxygen source. Any type of flexible urinary catheter or feeding tube can be used. In the author's clinic, pediatric feeding tubes or feeding tube/urethral catheters are used. The size of the catheter depends on the size of the patient; generally, 3.5 to 5.0 French (F) can be used in cats, and 5.0 to 8.0 F can be used in dogs.

This procedure can normally be performed in the conscious patient. Mild sedation maybe required in fractious patients. A topical anesthetic such as lidocaine (2%) or proparacaine will facilitate the placement. One or two drops in the nostril to be used will be adequate. The catheter is premeasured to the medial canthus of the eye. This is the distance the catheter must be passed via the external naris. Once placed, the tube can be attached using suture, super glue, or skin staples to the extemal naris, muzzle, and overthe frontal sinus. Most animals will require an Elizabethan collar to prevent removal. The distal end of the catheter must be adapted to fit an oxygen line coming from a tank or wall oxygen. Different types of adapters are available. The most commonly used are catheter adapters, but tuberculin or 1-cc syringes can also be modified and used.

Oxygen supplementation using this technique is expected to provide a fraction of inspired oxygen (FiO₂) of approximately 40%. It is best to use humidified oxygen to prevent damage to the respiratory epithelium. Reusable humidifiers can be purchased or rented from medical grade oxygen suppliers. This technique can be used safely for three to four days. Oxygentoxicity is an uncommon complication in this scenario. The flow rate of oxygen shouldbe approximately 0.1L/kg per minute, but higher rates may be necessary. Patients should be closely monitored by auscultation, blood gas analysis, pulse oximetry, or a combination of the above.

Taken from: Marks, S. L. J Amer Anim Hosp Assn 35. 366-367,1999 in ISU Vet Med, Mar 2000 , as reported in Veterinary News, July 2001, Penn State University, University Park, PA

Water – Becoming More Precious

Water shortages are affecting about 450 million people in 29 countries right now, and according to the World Water Forum in Stockholm, by 2025 one in three people will not have access to enough water.

Bottled water already costs more per gallon than gasoline, and it is unlikely that traditional agriculture will be able to feed the world's population by 2025 because of inadequate water supplies. The Yellow River in China, the Nile in Africa, and the Indus and the Congo in South Asia don't always reach the sea during the dry season. We may have to re-think our diets: it takes 16 times as much water to produce a ton of beef as a ton of grain.

K.C. Roberts, 2001

Ulcerative Keratitis Caused by *Streptococcus equi*

Infectious keratitis of the horse is very serious and challenging, with many associated problems. The equine cornea tends to scar as it heals, whether surgery is performed or not. It often vascularizes poorly or excessively. Although Gram-positive bacteria predominate in the normal conjunctival microflora of horses throughout the world, Gram-negative bacteria and fungi are more often isolated from equine ulcers. Beta-hemolytic *Streptococcus* spp. are associated with a very aggressive ulcerative keratitis with the capability to digest conjunctival graft tissue. Clinical signs are pronounced. Killing bacteria and fungi in the cornea is not a major problem as several drugs appear effective, but excessive tear protease activity and severe uveitis induced by microbial death can be difficult to control. Aggressive surgical and intensive medical therapy with topical antibiotics and protease inhibitors is indicated.

A retrospective clinical study (1996-99) of ulcerative keratitis associated with beta-hemolytic *Streptococcus equi* was done using Florida horses. Beta-hemolytic *Streptococcus equi* was cultured from 11 horses with deep ulcers, descemetocoeles or iris prolapse (n = 8), a suture abscess found with a penetrating keratoplasty for a stromal abscess (n = 1), and ulceration that developed following keratectomy/irradiation for corneal squamous cell carcinoma (n = 2). Beta-hemolytic *Streptococcus equi* subspecies *zoopidemicus* was found in 10 eyes and subspecies *equi* in one. Marked signs of uveitis including miosis and hypopyon were present in 8/11 (72.7%) eyes. Keratomalacia was severe in all eyes. The mean diameter of the ulcers associated with beta-hemolytic *Streptococcus* was 10.2 ± 6.1 mm. Eight of the eyes required conjunctival flap surgery (four grafts dehisced) and one eye corneal transplantation. Two eyes were treated with medication only. Isolate sensitivity to antibiotics included ampicillin (6/11), bacitracin (11/11), cephalothin (11/11), chloramphenicol (11/11), gentamicin (5/11), polymyxin B (2/11), and tobramycin (1/11). All isolates were resistant to neomycin. The average healing time was 44.7 ± 26.7 days. The visual outcome was positive in 8/11 eyes, and the globe retained in 9/11 eyes.

In most forms of infectious keratitis, the infection is characterized by an initial bacterial or fungal colonization of the corneal surface followed by invasion into deeper tissues, which then elicits an influx of inflammatory cells. Toxins produced by some organisms facilitate infection through cytotoxic destruction of the cell membrane or by inhibiting cellular protein synthesis. Once bacteria have attached to the ulcer site and invaded the corneal stroma, the host response is mediated by leukocytes. The microbes induce leukocytes in the tear film to release proteases that elicit inflammatory, and degradative processes. The enzymes produced by the leukocytes help destroy the invading microbes. Excessive levels of certain proteases in the tear film of horses can lead to rapid degeneration of corneal stromal collagen, potentially inducing keratomalacia or corneal melting, and corneal perforation. Proteases and other metabolites associated with beta-hemolytic *Streptococcus* spp. in the horse appear to be very powerful.

D.E. Brooks, Iowa State University Vet Med, Vol. 7, No. 1, January 2001. , as reported in Veterinary News, July 2001, Penn State University, University Park, PA

Would You Believe?

U.S Pharmacists filled more than 3 billion prescriptions in 2000, up from about 2 billion in 1990. Americans, 65 and older, take an average of six medications, including both prescription and over the counter drugs. Residents of long term care facilities take an average of eight medications per day.

Drug prescriptions sales totaled \$145 billion in 2000 up from \$65 billion in 1995. Sixty percent of doctor visits now end with the writing of a prescription.

Cryptosporidium and Giardia in Calves

The discovery of the protozoan parasites *Cryptosporidium parvum* and *Giardia duodenalis* dates back to the early 1900's. However, information on the prevalence and pathogenesis of these diseases is still being studied. These parasites are of interest to both the agricultural community and the public at large due to the health affects they can have on livestock and the potential for zoonoses.

Giardia duodenalis can infect most mammals, including humans, when cysts are ingested via feces or contaminated drinking water. Ingested cysts release trophozoites that reproduce by fission and colonize the small intestine. Infected hosts can be symptomatic or asymptomatic. Symptoms include malabsorptive diarrhea, increased intestinal motility, abdominal pain, weight loss, and allergies.

Cysts in water, feces, and soil are inactivated within one week at -4°C and within two weeks at 25°C. However, at 4°C *Giardia* cysts can survive 11 weeks in water, seven weeks in soil, and one week in cattle feces, remaining viable and having the potential to infect anew host. Prevalence in calves has been reported as high as 100% with cyst shedding starting at an average of 30 days of age. These calves can either clear the infection or remain chronically infected.

Calves with clinical signs of Giardiasis maybe treated with fenbendazole at 5 mg/kg for three days or 1 mg/kg for six days. A vaccine is commercially available for dogs, but not cattle. Giardiasis in calves is apotential zoonosis. Farmers and veterinarians should take precautions to avoid fecal-oral transmission of the parasite.

Cryptosporidium parvum, like *Giardia*, can infect most mammals via the ingestion of the oocysts. *C. parvum* infections have symptoms similar to *Giardia*, but the disease is self-limiting in the immunocompetent host. *C. parvum* oocysts are more environmentally resistant than *Giardiacysts*. At -4 and 4°C, the oocysts could survive in water and soil for over 12 weeks but degradation is accelerated at 25°C. *C. parvum* oocysts are also more rapidly degraded in feces and soil containing natural microorganisms.

Prevalence in calves has been reported as high as 100%, with the oocyst shedding starting on average at 16 days of age, ranging from 6 to 42 days. Diarrhea in calves where only *C. parvum* was identified started at 15 days of age and lasted on average three days.

Over the past couple of years the authors have investigated several reports of significant calf losses in beef herds due to *C. parvum* infection. In one case, IgG₁ levels indicated partial to full transfer of passive immunity to the calves via colostrum, but the calves' serum was low in selenium and vitamin A. Calves were typically shedding *C. parvum* at 105 oocysts/gram of feces. In one case, the emphasis was placed on supplementation of trace minerals and vitamins and the infection was cleared from the herd after two years. It is unclear exactly what aided in the clearing of the parasite. The second herd is going into its second calving season since the problem was diagnosed and supplementation of trace minerals and vitamins will also be recommended to assist in the stimulation of an immune response. Recently, a recombinant protein vaccine that prevents calves from getting the disease has been developed at North Carolina State University. Cows are vaccinated to stimulate the necessary antibodies in their colostrum. The vaccine is not yet commercially available.

Cryptosporidium parvum can produce serious intestinal disease in immunosuppressed individuals and in children. Precautions should be taken to prevent zoonotic transmission of this parasite.

M. Olson and B. Ralston, Alberta Agri. Animal Health Forum, Vol. 4, No. 4, December 1999, as reported in Veterinary News, July 2001, Penn State University, University Park, PA

Secondary Poisoning from Euthanasia Drug

Veterinarians use highly concentrated solutions containing sodium pentobarbital for euthanasia of both pets and farm animals. This potent drug; which is usually given intravenously, produces rapid unconsciousness without pain or distress to the animal, and lethal injection is considered an ideal method of euthanasia. Unfortunately, few people are aware that there is a hazard for secondary poisoning with euthanasia solution. In a notable case, 26 bald eagles were poisoned; 5 fatally, following ingestion of a cow that had been euthanized in British Columbia. The problem has occurred sporadically in both bald and golden eagles throughout the United States, and barbiturate toxicosis has become a too familiar diagnosis in eagles submitted to the National Wildlife Health Center, Madison, Wisconsin, and the U.S. Fish and Wildlife Service Forensics Laboratory in Ashland, Oregon.

At present, the problem appears to be limited to eagles; however, it is likely to affect other wildlife species that ingest the euthanized carcass. There is one reported case of a lion being poisoned after it was fed a euthanized horse. Farm animals, mainly cows and horses, that are left exposed in remote locations are frequent sources of toxicosis, but dog and cat carcasses that are not properly covered in landfills also are hazardous. Cases have been diagnosed more frequently in the winter and early spring, probably as a result of the difficulties associated with burying carcasses in frozen ground and the shortage of natural foods.

Sodium pentobarbital is a well-known sedative/ anesthetic, and therefore, clinical signs in affected birds include drowsiness, incoordination, and ultimately, unconsciousness and death. Poisoned birds may be found near the tainted carcass source or at distant locations. Birds that are not dead may recover if given supportive care; removal of the crop contents maybe helpful. The best diagnostic samples to confirm sodium pentobarbital poisoning are stomach contents or liver from the affected animal. Tissue samples from a suspect source carcass also would be useful. Veterinarians, landfill operators, and farmers who improperly dispose of euthanized animal carcasses maybe held legally responsible for wildlife toxicoses under authority of several federal regulations, so awareness of this potential problem is in everyone's best interest.

By Vic Nettles in SCWDS Briefs, Jan 2001, as reported in Veterinary News, July 2001, Penn State University, University Park, PA

European Demand for Horse Meat is Growing

With demand for beef decimated by BSE, and meat from all cattle, sheep, pigs and goats banned in Great Britain because of foot-and-mouth disease, there is a growing demand among European consumers for horse meat. Agriculture Canada recently reported that Canada is exporting 160 tons of horse meat a week to France and Germany. Orders are also being received from Belgium, Italy and Japan.

"U.S. horse owners need to take extra precautions," warns Jody Henderson, manager of Texas and Southwestern Cattle Raisers Association's Horse Identification Program (HIP). "Horses will be bringing high dollars. That makes them mighty attractive to thieves, who'll try to get them to slaughter plants in Canada and Mexico."

HIP has established contacts with those plants for quick response when horses are reported missing, Henderson said. "Protect your horses by enrolling them in the HIP database now," he urged.

For more information, call Henderson toll-free at (866) 646-8520 or access TSCRA's web site at www.texascattleraisers.org

From Texas and Southwestern Cattle Raisers Association News Update, Vol. 23, No. 5, March 12, 2001 in Texas Vet Quarterly Review, Jan-Mar 2001, as reported in Veterinary News, July 2001, Penn State University, University Park, PA

EKG Findings in Dogs with Motor Vehicle-Related Trauma

The shape of the chest and the relative mobility of the heart within the thorax are thought to predispose dogs to myocardial injury when dogs are struck by motor vehicles. This may result from rib compression or from impact of the heart against the interior of the rib cage or sternum. In addition, sudden acceleration or deceleration of the heart in the thorax, pressure of shock waves transmitted along the coronary arteries, or sudden changes in intrathoracic pressure can result in cardiac damage. Injury to the nervous system, leading to unbalanced autonomic input, and ischemia or acidosis due to hypovolemic shock or reperfusion injury can cause or exacerbate myocardial cell damage. Hyperlactatemia, presumed to be related to lactic acidosis, has been reported to occur frequently in severely traumatized dogs.

Motor vehicle-related injury is the most common form of trauma incurred by dogs, and cardiac arrhythmias are a well-recognized complication. Although posttraumatic arrhythmias are often observed little is known regarding their frequency. This study utilized continuous ambulatory electrocardiography (i.e., Holter monitoring) to describe the cardiac rhythm disturbances in 30 dogs sustaining trauma in motor vehicle accidents.

Ventricular ectopy was identified by Holter monitoring in 29 of 30 dogs, although the initial electrocardiogram (EKG) only documented ventricular ectopic complexes (VECs) in four dogs. Ventricular ectopy was infrequent in most dogs (i.e., 62% of the dogs had less than 100 VECs per day for the entire study), but 16% developed frequent arrhythmias (greater than 4,000 VECs per day). Forty-three percent of dogs had at least one episode of ventricular tachycardia, including several dogs that had an overall infrequent rate of VECs (i.e., less than 100 or 100 to 1,000 VECs per day). In all cases, the arrhythmias were observed on the first recording day, and they decreased in frequency over the four days. Despite the documentation of ventricular tachycardia in some dogs with rates over 200 beats per minute, no clinical abnormalities that could be ascribed to the arrhythmias were observed.

Dogs sustaining significant injury (not just thoracic or head/neck trauma) as a result of vehicular accident should have an EKG performed. Although baseline EKGs are useful in identifying arrhythmias in most dogs, the length of the recording should be increased to improve the likelihood of observing an abnormal EKG event. Most importantly, additional EKGs should be obtained or continuous EKG monitoring should be performed in dogs that display clinical signs that could be attributed to ventricular arrhythmias.

Taken from: Snyder, P. S., et al J Am Anim Hos Assoc 37:55-63, 2001, as reported in Vet Med, Vol. 7, Issue 4, July 2001, Iowas State University, Ames, IA

Would You Believe?

Michigan has shoreline on 4 of the 5 Great Lakes, for a total of over 3000 miles. Michigan also has more light houses than any other state (126)

K.C. Roberts, September 2001

**Opportunities in Continuing Education
Fall 2001 & Spring 2002**

<u>Date</u>	<u>Topic</u>	<u>Location</u>	<u>Contact Hours</u>
Nov. 9-11	Advanced Echocardiography	Blacksburg	21
Nov. 16-17	Orthopedic Surgery of Canine Hindlimb	Blacksburg	14
Dec. 7-8	Applied Ultrasonography	Blacksburg	10
Dec. 10-14	Intensive Orthopedic Week	Blacksburg	42
Mar 8-9, 2002	Diagnostic Ultrasonography	Blacksburg	10
May 3-4	Introductory Endoscopy	Blacksburg	10

Please note: The courses listed above are limited enrollment and feature a hands-on laboratory experience under the guidance of clinical faculty members. Program brochures provide course details. For registration or more information, please contact: **Anne Clapsaddle**, VMRCVM – Virginia Tech, Blacksburg, VA 24061, (540) 231-5261; or **Conference Registration**, Continuing Education Center, (540) 231-5182.

Aquatic Animal Medicine Diagnostic Services of the VMRCVM

As the number of individuals keeping aquatic organisms increases across the country, the expansion of diagnostic services for aquatic cases has been included in the services provided by the Virginia-Maryland Regional College of Veterinary Medicine. These services, under the direction of aquatic veterinarian Dr. Stephen A. Smith, include examination of water quality, antimortem and postmortem examination, and bacterial, viral, parasitic and histopathological evaluation. As with referral of domestic animal cases to the College, personal contact is required prior to sending material to the College because of specific sample submission requirements.

Once delivery has been scheduled, the practitioner should send six to ten live fish (tropical, ornamental, or foodfish) by overnight express service. The fish should be transported with a small amount of water in a sealed plastic bag in a leak proof container protected from temperature extremes. If water qualities are also to be determined, a separate container of water should be included.

Water quality has a significant effect on aquatic animal health, and in-house evaluation of water quality is of paramount importance to all clinical diagnostic evaluations. Thus, a separate water sample helps reduce any changes that might occur in the parameters of the water due to the presence of the fish during transit.

In addition, obtaining a clear, concise history of a disease problem or outbreak is an essential component of the diagnostic process. A complete, accurate history is a prerequisite to selection of appropriate diagnostic techniques as well as the formulation of any management or therapeutic plan.

Alternatively, instead of submitting live organisms to the diagnostic service, appropriate samples of formalin fixed tissues can be submitted for diagnostic evaluation though there are some limitations to the amount of information obtained with this method. Frozen specimens are of almost no diagnostic value and are discouraged.

For consultation and referral, please contact Dr. Stephen A. Smith at the VA/MD Regional College of Veterinary Medicine, Phase 11, Duck Pond Drive, Blacksburg, VA 24061-0442. Telephone number 540-231 -51 31 .

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