Pacific Tide

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Dr. Robison received his Doctorate in Veterinary Medicine from UC Davis in 1995, and completed his internship the following year at Santa Cruz Veterinary Hospital. He remained in Santa Cruz in general practice until 1998 when he became one of the vanguard of doctors who began PVSES. Dr. Robison is known for his great and abiding love and advocacy for *all* creatures, as well as for his exceptional skills and wide-ranging knowledge in emergency medicine. He enjoys his life with his wife Cynthia and two boys, Sebastian and Gabriel. He also has many dogs, cats, chickens and a horse.

Toxicology in dogs and cats

Practical tips and emerging treatment options

Some patients who present with a known or suspected toxin exposure can be a challenge to diagnose and treat; while others may be straight forward. Often these critters are severely affected, and frequently they are cases which are quite rewarding to treat. A common sense approach to the patient with probable toxin ingestion has worked well for many of my patients over the years. Based on the patient's history and clinical signs one can create a fairly comprehensive list of possible culprits. Common examples of toxins which require rapid and specific interventions include ethylene glycol toxicity, ingestion of Amanita mushrooms, NSAID's, Acetaminophen, rodenticide (anticoagulants, bromethalin, strychnine), xylitol, zinc, organophosphates and carbamates, lilies, and it seems with increasing frequency grapes, currants, and raisins. Hops, sego palm, and various prescription drugs are less common culprits but may also be seen.

The initial evaluation includes our most powerful tool, the physical exam. When possible this should include a digital rectal exam for stool evaluation, which can give us valuable clues such as the presence of blue-green material (rodenticides), garbage/compost, or even the odor of metaldehyde. The next step of initiating therapy is always dictated by our exam findings, and may include the need to provide immediate support to an animal in hypovolemic shock, to control seizure activity, or to secure an airway. While initially stabilizing the patient, the critical step of obtaining an accurate and detailed history must be performed. The patient's environment, including an ability to roam free or any potential toxins in that environment, and the time of onset of clinical signs are of particular importance. An accurate and complete history alone will often give us the answers we are looking for. At times when illicit drugs are suspected, a gentle and skilled approach to the discussion will be required to obtain the required information. If a toxin has been identified or is suspected, the value of a consultation with a toxicologist should not be underestimated. My experience with the ASPCA Poison Control Center has far surpassed experiences with other similar services. (http://www.aspca.org/Home/Pet-care/poison-control , phone number (888) 426-4435)

LABWORK:
Laboratory evaluation is indispensable, and should be performed in house when possible to be able to quickly determine the nature and severity of the metabolic disruption. Care should be taken to obtain the lab samples as soon as possible, and prior to the administration of any medication which could interfere with results. Most notable for this concern is ethylene glycol, for which specific

compounds can create false positive results including propylene glycol (the carrier in diazepam and many other injectable drugs), mannitol, sorbitol, and isopropyl alcohol. Urine drug tests are used routinely at our hospital and are of value, but unfortunately THC results are not accurate due to interference from a variety of metabolites present in dog urine. There are many toxins which may result in relatively normal initial laboratory values and later reveal significant changes. Examples include ethylene glycol, which may not result in azotemia for 24-48 hours in dogs and or before 12 hours in cats. With ethylene glycol we must be alert for more subtle changes on initial results such as decreased tCO2, increased serum osmolality, and increased anion gap, which can be present within 1-3 hours of ingestion. The presence of calcium oxalate crystals in the urine may be seen as soon as 3 hours post ingestion in the cat and 6 hours in the dog. Many of the hepatotoxins such as Amanita, and nephrotoxins such as grapes, currant, raisins, lilies, and NSAIDs will not result in significant abnormalities until 12 to 48 hours after exposure. With anticoagulant rodenticides, PT prolongation is not seen until 36-48 hour post ingestion, followed by PTT prolongation 6-18 hours later.

DECONTAMINATION:

Decontamination should be considered a priority in our patients. Which method to use should take serious consideration based on several factors including the condition of the patient, the elapsed time after exposure to the toxin, the route of exposure, and the toxin to which the animal was exposed. Emesis should only be considered if the animal is thought to have an acceptably low risk of complications. Circumstances which are associated with increased risk include altered levels of consciousness, brachiocephalic syndrome, toxins causing caustic or corrosive injury to the esophagus or oropharynx, or any underlying medical conditions predisposing patients to aspiration. Time from ingestion of the toxin, toxin form (liquid, solid, gas), and potential for delay of gastric emptying will all impact decontamination choices. Many toxins including salicylates, opioids, anticholinergics, tricyclic antidepressants, xylitol containing gum, grapes/raisins, and chocolate may cause delayed gastric emptying. Abdominal radiographs can be considered to evaluate the volume of ingesta in the stomach if emesis has resulted in limited success, or if gastric lavage is being considered. In some patients gastric emptying may be markedly prolonged.

- In dogs, apomorphine given IV or IM should result in emesis within 5-10 minutes. If emesis does not occur a second titrated dose can be administered, and/or 3% hydrogen peroxide at 1-5ml/kg, not exceeding 50ml, can be administered. Naloxone can be used to reverse the sedative effects, but not the emetic effects of apomorphine.
- Emesis is much more challenging to induce in cats, and apomorphine is currently not recommended in this species. Hydrogen peroxide is used by some in cats, but can cause severe gastritis (with deaths reported), and is largely ineffective. I have had the most success with xylazine at 0.44mg/kg, IM or SQ, which should result in emesis within 10 minutes but can result in significant CNS and respiratory depression. Xylazine can be reversed with either yohimbine at 0.1mg/kg IM, SQ or IV slowly, or atipamezole (Antisedan) at 25-50 mcg/kg IM. Alternatively, Dexdormitor at about 10mcg/kg or a combination of low dose hydromorphone (0.05mg/kg) and midazolam (0.2mg/kg) SQ are used by some.
- Gastric lavage must be considered in patients when inducing emesis is contraindicated or unsuccessful. Due to the risk and limited efficacy associated with gastric lavage, its use must be carefully considered on a case by case basis.
- Activated charcoal can be effective at reducing absorption and enhancing elimination of many toxins, and should be used when indicated. The doses administered depend on the product being used. The use of products containing cathartics should be limited to patients that receive supplemental fluids and are not at risk of dehydration. Repeat doses of activated charcoal should be considered with toxins that undergo enterohepatic circulation. The volume used is about half of the initial dose, and the product used should not contain a cathartic. The use of an antiemetic can be considered to help increase the chances of the AC staying where it needs to be.
- Less common methods of decontamination include surgical or endoscopic retrieval of batteries, zinc containing coins, Amitraz collars and fentanyl or nicotine patches. Dermal decontamination to limit the absorption of pyrethrins and other topical compounds should be performed by bathing with a liquid dish washing detergent, and possibly shaving the area of application/contamination. Make sure that the patient is adequately sedated for the procedure, that the people handling the patient use appropriate protection to avoid contact with the toxin, and that the patient is properly supported after the procedure, including avoidance of hypothermia. Whole bowel irrigation (WBI) involves the use of large amounts of polyethylene glycol

electrolyte solution administered orally, and is frequently used in human medicine. The procedure effectively flushes the entire gut and may be a promising technique to consider for our veterinary patients in the future.

TREATMENT OPTIONS:

- For certain toxins, fluid therapy can have beneficial actions including forced diuresis, helping to protect kidney function, maintaining hydration needs, and promotion of toxin excretion.
- Antidotes: Specific antidotes are indicated for certain toxins.

Antizol-Vet, the standard antidote for ethylene glycol toxicity, has been discontinued, but fomepizole is available from several compounding pharmacies. In cats, the off label use of fomepizole at doses about 30 times higher than in dogs has been reported to be effective. Unfortunately, in cats, treatment within 3-6 hours is critical, with some sources reporting 100% fatality rates if treatment with fomepizole or ethanol is not initiated within 4 hours of ingestion.

Patients who exhibit life threatening bleeding secondary to anticoagulant toxins should always be treated with fresh frozen plasma in addition to Vitamin K1.

Amanita toxicity patients may benefit from the intravenous milk thistle preparation Legalon-Sil. Unfortunately it is only available in Europe at this time and cannot be obtained for veterinary use in the United States. Hopefully this will change soon, but there is no indication when or if this will occur.

- Another emerging treatment option which has shown promise, is the use of intravenous lipid emulsions to treat toxicities caused by a variety of lipophilic drugs. This includes ivermectin, as well as local anesthetics, amlodipine, carprofen and digoxin. Veterinary medicine has not yet acheived a full understanding of the specifics of this therapy, but favorable clinical responses in animals experiencing clinical signs of toxicosis have been demonstrated for certain toxins.

TOXIC PLANTS:

In the greater Monterey Bay area there are many toxic plants that can cause a range of symptoms from drooling/nausea to liver or kidney failure. The ASPCA Poison Control Center website has photographs and information on many of these species. One particular syndrome worthy of mention is caused by local plants containing belladonna plant alkaloids. If material from these plants comes in direct contact with the mucus membranes of the eye it can result in a transient (1-2 days) anisocoria - a differential to consider if you have a patient with anisocoria and no other neurologic abnormalities. Common names of some plants containing this alkaloid include Trumpet plants (Brugmansia), Thorne Apple/Jimsonweed (Datura) and Nightshade (Atropa belladonna).

HEADLINES:

Experimental interventions for Amanita mushroom toxicity have recently made headlines, with the description of gallbladder drainage resulting in an improved clinical condition in one dog. The benefit is theoretically through minimizing the effects of Amanitin toxin by removing it along with the bile. Unfortunately, at this time, there is no clear evidence proving that the benefits of this procedure outweigh the risks for most clinical patients. We hope to have a better understanding of the pathophysiology and metabolic implications of this therapy in the future, but at this time it is not yet being embraced by all veterinarians as a standard therapy for all patients with clinical toxicity from Amanita mushrooms.

Treating the poisoned patient is often rewarding, yet at times can be heartbreaking. The majority of patients which present with an intoxication are young, mischievous, and tend to be in good health with ample reserves. Their clinical signs are often dramatic and frightening to their owners, yet with our education, skill, and experience we are a very fortunate group of people to be in a position to be able to do a lot of good.

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About Our Organization

PVSES was founded to provide high quality, specialized medical care to companion animal patients. Our practice is dedicated to serving the veterinary community as a partner in total patient care. We offer comprehensive specialized services including endoscopy, Doppler ultrasound, surgery, 24-hour ICU care, and emergency and critical care. Our staff is committed to providing compassionate and thorough medical care that meets the needs of the patient, client, and referring veterinarian.

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