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Keeping Pets Safe from Desert Dangers

Dr. Heather E. Connally, DVM, MS, Diplomate American
College of Veterinary Emergency and Critical Care

Veterinary Specialty Center of Tucson
4909 N. La Canada Drive Tucson, AZ
520-795-9955



Dangers we'll discuss

- Rattlesnake envenomation
- Gila Monster attack
- Colorado River Toad toxicity
- Animal attacks
- Cactus encounter
- Allergic reaction
- Heatstroke
- For each, will discuss
 - Important information, signs of the problem
 - What to do in the field (if anything)
 - Treatment and monitoring in hospital
 - Preventive measures (if any)

Rattlesnake envenomation

- Can strike $\sim \frac{1}{2}$ body length, speed of 8 ft/sec
- 1 to 6 puncture wounds from single bite (ancillary fangs can rotate forward)
- Don't always rattle before striking
- 25% are dry bites = skin penetration w/o envenomation



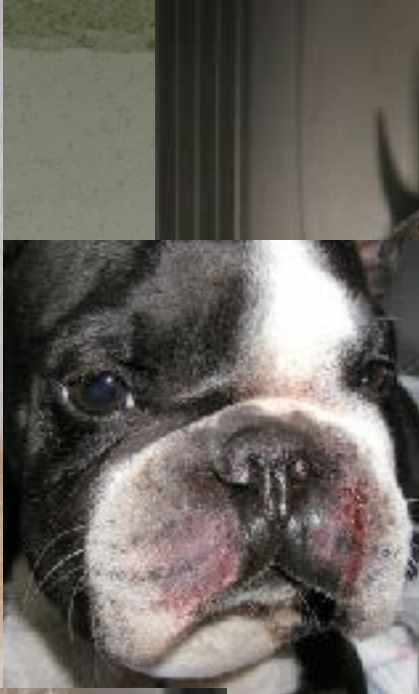
Determinants of toxicity

- Species of snake
- Size and health of snake
- Venom volume injected – defensive vs offensive
- Depth of the bite
- Victim size, age, species
- NO change in venom toxicity w/ time of year but snakes more aggressive in summer months
- 90% of bites April to Oct



Toxic effects of rattlesnake venom

- Enzymes in venom allow spread through tissues
- Problems w/ clotting
- Tissue death
- Damage to lining of blood vessels leads to leakage of blood and fluid into tissues
- Fluid loss can lead to hypotension/hypovolemic shock





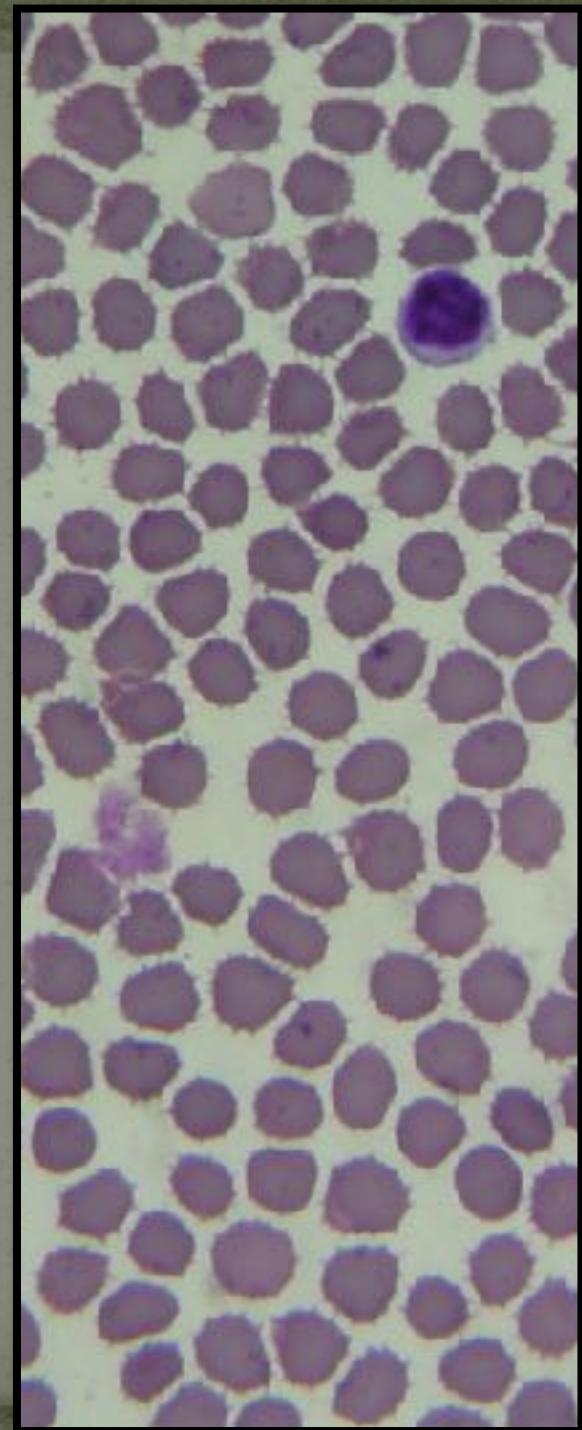
Treatments – prior to arrival

- DON'T recommend
 - Ice
 - Incision and suction
 - Tourniquets
 - Hot packs
 - Electroshock
- DO recommend
 - Keep patient calm
 - Keep bite site below heart if possible
 - Transport to nearest veterinary facility



Once at the hospital

- Brought straight back to ICU for evaluation
- Vitals & physical examination
- Blood work
 - Blood smear
 - Change to red blood cell surface
 - Decrease in platelets
 - Assess overall health
 - Clotting parameters if excessive bleeding



Treatment

- Treatment
 - IV fluids
 - Antivenom treatment – typically 1-4 vials
 - Pain medication
 - Antibiotics
 - Therapeutic laser



Complications of envenomation

- Tissue death and sloughing – sometimes requires surgery weeks after envenomation
- Problems clotting blood
- Excessive protein loss and blood loss or destruction
- Pigmented urine – urine discolored brown/red
- Vomiting/regurgitation
- Multiorgan dysfunction and failure (uncommon)

Prevention – these will hold true for all desert dangers.

- Never let your cat outside
- Never let your dog (esp if small) outside unattended
- Minimize walk/hike with your pet off leash
- Cut all shrubbery from around your fence or adobe wall – snakes will use it to scale the wall
- Cover holes in bottom of adobe wall used for drainage with chicken wire
- Close even the smallest gaps at the bottom of gates into the backyard
- Consider moving wood piles out of your yard

What about rattlesnake vaccine?

- Even if pet is vaccinated, **ALWAYS** seek veterinary attention after rattlesnake envenomation
- We don't recommend it
- Studies done in mice not dogs or cats
- Some think it may give you extra time to get to vet clinic
- In our experience it does not eliminate need for antivenom administration



Red Rock Biologics

Avoidance training?

- About the best thing you can try
- Teach them to avoid sight, sound and scent of snake
- Not 100% effective in our experience – is it the dog or the trainer?



Gila Monster attack

- Can reach almost 2 ft in length
- Generally slow moving but can strike relatively quickly
- Venom used for defense
- Venom excreted from glands located on lower jaw
- Raid burrows and nests – consuming eggs & preying on young of birds and small mammals
- Dogs most commonly attacked



Gila Monster Attack

- Delivery of venom relies upon grasping and chewing
- Bite tenaciously – may present pet w/ lizard still attached
- Degree of envenomation most likely function of duration of bite
- Toxic dose for dogs & cats is unknown. One known fatal bite in 44 lb dog – lizard still firmly attached, duration of bite unknown



Gila Monster Attack – clinical signs

- Humans report gila monster bite more painful than rattlesnake bite – pain peaks within 1 hr after bite, may last 24 hrs
- At bite site
 - Bleeding (may be profuse)
 - Teeth may be present in wound
 - Edema (swelling)
 - Rarely tissue death
- Systemic signs: increased heart & respiratory rates, vomiting, increased urination, salivation, tearing, decreased blood pressure

Gila Monster Attack – care

- Try to remove the lizard – prying instrument between the jaws and push against back of mouth
- Recommend hospitalization for at least several hours – monitor for evidence of progression of envenomation
- Obtain at least temperature, respiratory and heart rates, blood pressure and other diagnostics (blood work) as indicated
- Clean bite site, remove any teeth fragments
- Antibiotics for wound
- Fluids and other supportive care as indicated by signs

Colorado River Toad



- Sometimes mistaken for bullfrogs because of their large size and relatively smooth skin.
- The prominent bumps below the eyes = parotoid glands, characteristic of true toads.
- Parotid glands and skin contain organic toxic substances, have been known to paralyze or kill dogs
- AKA Sonoran Desert toad, largest western toad, reaching a length of over 7" (not including legs)!
- Well-adapted to desert life - active almost exclusively at night, particularly during or after summer rains.

Toad Toxicity – Signs

- See dog playing w/ toad
- Usually happens at dusk or evening walks, especially after rain
- Brick red gums, hypersalivate, paw at mouth, vocalize, anxious
- May become disoriented, circle, stumble, fall, have increased respiratory rate & temperature, vomit
- Severe signs – seizure activity, stupor to coma
- Within few minutes of exposure signs develop, most toxic effects seen within 30 to 60 min to after contact



Home Care



Toad toxicity

- Heart arrhythmias possible – heart rate may be too slow or too fast
- Blood work may be recommended depending on condition of pet
- Treatment in hospital,
 - Flushing of mouth (unless unconscious or seizuring) – 2 to 3 times 5 to 10 min
 - Use of drugs to treat seizure activity or arrhythmias as needed
 - IV fluids – especially if pet is vomiting, temperature has been significantly elevated for period of time

Animal Attacks



First aid prior to transport

- Getting your pet away – BE CAREFUL
 - With wild animals, make yourself big, loud
 - With other dogs – use water, stick
- First and foremost, PROTECT YOURSELF
 - Can use nylons, scarf, rope, even a leash as muzzle
 - Consider whether your pet needs to pant – loosen muzzle once finished manipulating pet
 - With small dog, can throw thick towel over them
- Then protect pet from further damage, contamination
 - Wrap pet in towel if multiple wounds
 - Homemade bandage to limit further bleeding
 - Preparation of homemade splint if you suspect broken leg

Initial assessment

- ALWAYS have your pet evaluated by a veterinarian
- You can think there is minimal damage but it could be fatal if left unattended!
- Even if you bring pet in & we do everything possible, sometimes the damage is too severe/extensive
- TIP OF THE ICEBERG CONCEPT - there can be minimal damage on the outside but extensive, life threatening damage on the inside



Animal attack – hospitalized care

- Evaluation / diagnostics
 - Vitals – body weight, temperature, pulse, resp rate, blood pressure
 - Blood work

Once stabilized

- X rays as indicated – chest, abdomen, extremities
- Sometimes ultrasound – especially if concerned about abdominal wall hernia or damage to internal organs

Initial treatment

- Shock – IV fluids, drugs as indicated
- Pain medication – initial injection then continuous infusion of morphine or derivative
- Oxygen therapy for chest trauma & shock
- Antibiotics
- Bandage wound
 - Stop bleeding
 - Protect from further contamination
 - Chest wounds – limit communication of outside w/ chest cavity

Secondary treatment

- Wound management
 - Sedation vs general anesthesia
 - Clip fur, clean & flush wounds
 - Partial wound closure?
 - Place drain(s)?
 - Bandage?
- Abdominal exploratory surgery?
 - Abdominal wall hernia
 - Concern about organ damage
- Chest tube? (if damage to lung causing leakage of air)
- Sometimes blood products – packed red cells, plasma
- Rabies booster

Monitoring

- Vitals – temperature, pulse, respiratory rate, blood pressure several, body weight
- Respiratory rate and effort more frequently for patient with chest trauma
- Patient comfort
- Blood work - daily evaluation of
 - Hydration
 - Electrolytes & acid/base balance
 - Red blood cell and protein decrease (fluid dilution, loss from wounds)
 - +/- Organ function

Animal attack - prevention

- Warding off the offender
 - Stun gun – have to make contact
 - Baton



Consider rabies vaccination

- If travelling between states, always bring proof of rabies vaccination
 - In case pet is attacked by wild or domestic animal w / unknown vaccine status
 - In case your pet bites you or veterinary personnel
- No vaccine history – 180 days (6mo) mandatory hospitalized quarantine (not at home) or euthanasia
- Overdue for vaccinations – possibly 45 days at home quarantine
- At discretion of animal control officer

Cactus encounter

- Signs are obvious



Field Care

- Be prepared – when out hunting, carry a leatherman tool (not tweezers)





Treatment

- If bad enough, covering body extensively, in mouth, on face – will need veterinary care – we will need to heavily sedate or anesthetize
- Is also possible to penetrate the cornea – trip to see the ophthalmologist!
- Is possible that unidentified cactus spines can migrate through the body, monitor over next days to weeks to months for signs of infection



Allergic Reaction

- Causes – vaccines; insect bite or sting (bee, wasp, possibly certain spiders, scorpions, other insects). Note that we do have killer bees which are VERY aggressive
- Mild allergic reaction all the way to anaphylactic shock and death (multiple stings, especially to small pet)



Allergic (anaphylactic) reaction signs

- Welts
- Facial swelling
- Facial itchiness
- Vomiting
- Diarrhea
- Difficulty breathing
- With anaphylactic shock there can be collapse, low blood pressure – signs more severe, more likely life threatening



Signs and sequelae of multiple stings

- Muscle death
- Red blood cell destruction
- Acute kidney failure from direct damage to kidney by venom, enzyme released w/ muscle death
- Myocardial infarction has been documented – heart arrhythmias
- Usually febrile
- Depression

Signs and sequelae of multiple stings

- Neurological signs can include facial paralysis, drunken gait, seizures
- Dark brown or red urine
- Bloody feces and/or vomit
- Problems with red blood cells or ability to clot blood

Treatment

- Milder signs
 - Dexamethasone sodium phosphate – rapid acting steroid
 - Benadryl – antihistamine, H1 blocker
- More severe signs / anaphylactic shock
 - Dexamethasone and Benadryl
 - Famotidine (Pepcid) – H2 blocker
 - Epinephrine
 - IV fluids – sometimes 2 different kinds
 - +/- Continuous infusion of drugs
 - Pain medication – infusion of morphine or derivative
 - Antiarrhythmics
 - Drugs to improve blood pressure

Monitoring

- Simple allergic reaction treated and sent home for monitoring by owner
- Severe anaphylaxis
 - Vitals frequently
 - Continuous blood pressure, ECG monitoring
 - Lab parameters to monitor organ function, hydration

Allergic reaction or Snake bite?

- Pain – no pain w/ allergic reaction
- Bruising – none with allergic reaction
- Bleeding puncture wounds – not with allergic reaction, sometimes get lucky and can find the stinger!
- Asymmetric swelling with snake bite

Heatstroke – predisposing factors

- Factors affecting heat dissipation
 - Confinement and / or poor ventilation
 - Increased humidity
 - Water deprivation
 - Certain drugs
 - Anatomy of the pet (bulldog)
 - Obesity
 - Underlying diseases – heart, neuro, muscular, laryngeal paralysis
 - Age (geriatric)
 - Previous heatstroke
 - Thicker hair coats, darker color

Heatstroke – Predisposing Factors

- Factors affecting heat production
 - Certain drugs / foods – amphetamines, metaldehyde, organophosphates, halothane, macadamia nuts
 - Seizures
 - Severe muscle tremoring (eclampsia)
 - Hormonal problems, endocrine diseases
 - Exercise
 - Any disease causing fever

Heatstroke - consequences

- Multiorgan dysfunction and failure - especially...
 - Kidneys
 - Gastrointestinal tract
 - Brain
 - Liver
 - Clotting system & blood
 - Lungs
- Sepsis – bacterial infection in blood stream

Signs

- Excessive panting
- Collapse
- Decreased responsiveness to coma
- Vomiting and/or diarrhea – often bloody
- Difficulty breathing
- Seizures
- Sudden onset of bruising (look underside belly, ears)
- Shock – weak pulses, incr heart rate
- Discolored urine



What can you do?

- Cool your pet immediately (normal temp 100-102.5 F)
 - Wet pet with tepid water but NOT ICY COLD as this will cause constriction of vessels at skin surface further increasing core temperature, shivering
 - Fan, windows down in car, air conditioner blowing
 - DO NOT cover w/ wet towels – holds heat in
 - BE CAREFUL NOT TO OVERDO IT – hypothermia makes for worse prognosis
- Immediate presentation to a veterinary clinic
 - Further evaluation
 - Labwork – initial and repeat parameters
 - Aggressive supportive therapy

Initial evaluation

- Ensure open airway and provide oxygen
 - Sedation may be necessary to calm patient or intubate
- Provide external cooling
 - Wet down w/ fans blowing
- IV catheter
 - Obtain pretreatment blood sample
 - Check percentage red blood cells, clotting, organ function
 - START IV fluids which will start internal cooling & rehydration

Heatstroke - treatment

- IV fluids, fluids, fluids:
 - Rehydration
 - Maintenance
 - Normalize electrolyte derangements
 - Replace ongoing losses
- Correct decreased blood sugar with dextrose
- Antibiotics – prevent secondary infection, sepsis
- Antiemetics, GI protectants (IV pepcid [famotidine], prilosec [omeprazole])

Heatstroke - treatment

- +/- Blood products – PLASMA, packed red blood cells
- +/- Analgesics
- +/- Continuous infusion of drugs:
 - Maintain blood pressure
 - Treat heart arrhythmias
- Anything else indicated based on organ dysfunction
 - Kidneys
 - Brain

Monitoring

- Vitals – temp, pulse, resp rate
- Continuous blood pressure
- Continuous ECG – rate & rhythm
- Urine output – color and volume
- Many different blood parameters
 - Percentage red cells, protein levels, blood sugar
 - Parameters to evaluate organ function (esp kidney, liver)
 - Platelets and white blood cells
 - Clotting parameters
- Neurologic status
- Respiratory – chest x rays, arterial blood gas



Unfavorable prognostic criteria

- Comatose mental status or neurologic deterioration
- Decreased body temperature
- Decreased blood sugar (persistent)
- Increasing kidney values & low urine output in the face of adequate fluid therapy
- Life threatening clotting / coagulation problem
- Refractory hypotension
- Elevated total bilirubin
- Ventricular arrhythmias
- Persistently low proteins
- Labored respiration, pulmonary edema

Heatstroke - prevention

- Walk/hunt w/ dog EARLY, especially in summer time
- No outside play or exercise during middle of day ~April through October
- Adequate ventilation
- If pet is left outside
 - PLENTY OF SHADE
 - PLENTY OF COOL WATER – also kept in shade
 - Ideally kiddie pool, somewhere they can get wet
- No exercise in summer if predisposing factor present
- If your pet has any of the signs – bring to emergency room RIGHT AWAY – don't wait to see how pet does

Why Veterinary Specialty Center of Tucson?

- We are open 7 days a week, 24 hours a day – includes weekends and all holidays – emergency & critical care
- Always vet(s) & vet techs to evaluate and care for your pet in a state-of-the art facility
- Other services we provide (board certified specialists in a variety of fields) – emergency doctor or criticalist may call upon to transfer the case for further care or may request consult for another opinion
 - Surgery, Internal Medicine, Neurology, Radiology, Ophthalmology, Dentistry, Dermatology

