



Hailing from southern Arizona, Katie went to Pima College where she got her AAS in veterinary technology. She then expanded her career and became a CVT there, and then received her RVT in California. She worked as an ICU tech for a 24-hr emergency hospital in Arizona and then made the move to CA and continued her experience in emergency and intensive care at ASEC. During a brief relocation to Texas, she joined the Veterinary Emergency Group and continued honing her ER skills. She made her way back to Cali and re-joined the ASEC team as a vital member caring for patients in urgent need. Katie is currently working towards obtaining her veterinary technician specialty (VTS) in emergency and critical care. Outside of vetmed things she enjoys baking, camping and pottery! She and her husband share their home with a terrier mix named Chunk, and an orange tabby named Walter.

KATIE COURTNEY, RVT, CVT

ASEC SYMPOSIUM
2024

SNAKEBITE TRIAGE: DANGER NOODLES ON THE LOOSE!

PRESENTED BY: KATIE COURTNEY RVT, CVT



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OVERVIEW

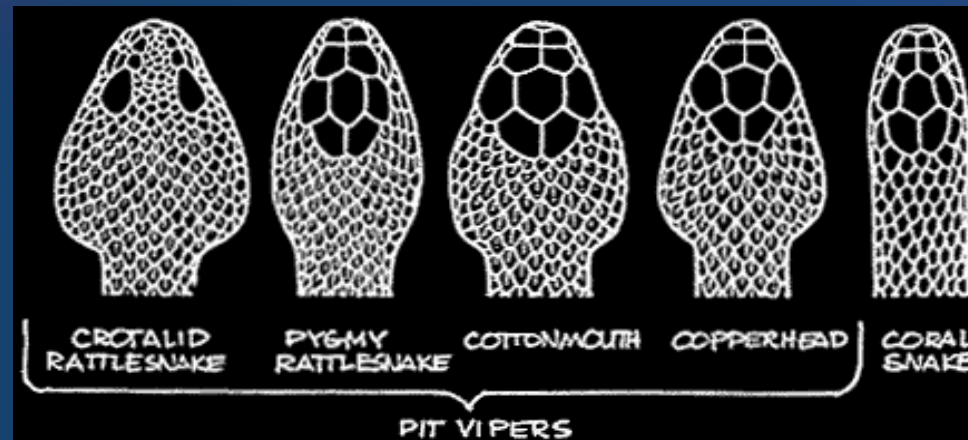
- What is snake envenomation, how, & when?
- Venomous snakes in the U.S.
- Toxin types: Quick pathophysiology
- Presenting signs for snake envenomation
- Triage breakdown & case example
- Tips for care of snake bite patients

WHAT, HOW, & WHEN?

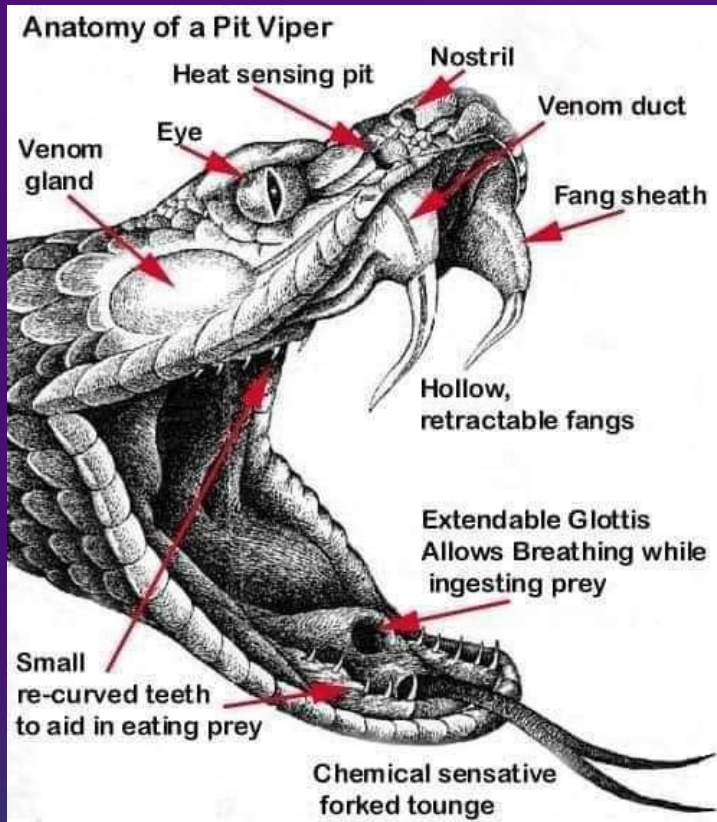
- A bite from a snake where venom is released causing either local or systemic effects, usually both!
- How? Dogs are curious, and cats are bullies!
- Most common in warm summer months: Reptiles, people, & pets tend to be more active

COMMON VENOMOUS SNAKES FOUND IN US

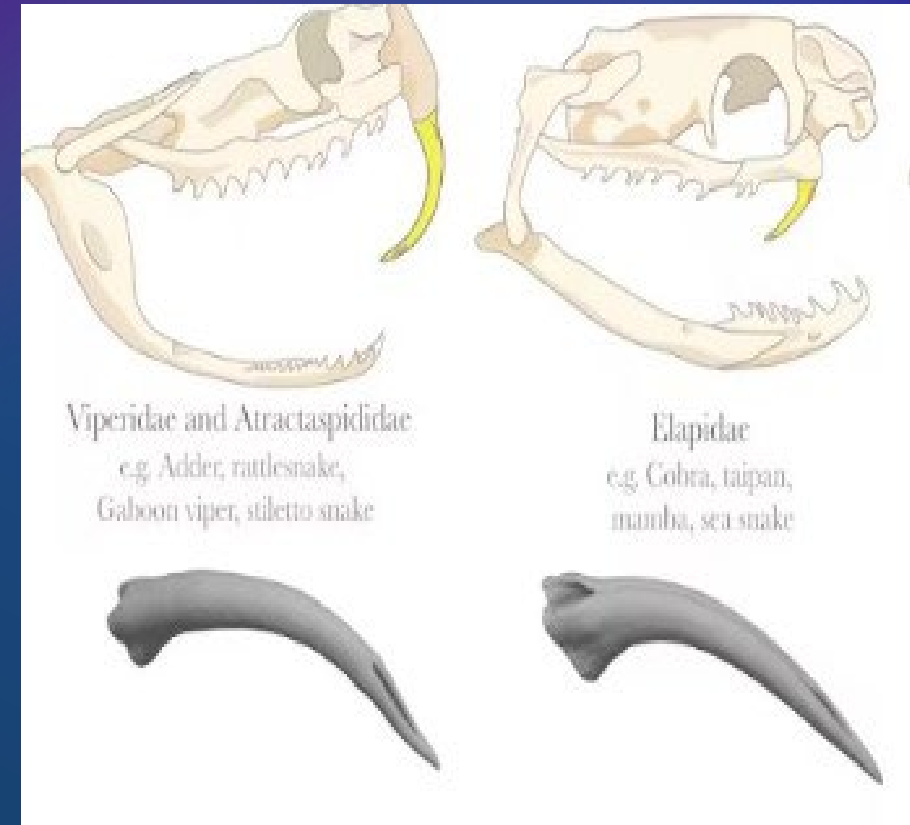
- Around 30 native venomous species of snake in U.S
- Two types: Crotalids & Elapids
- Major differences: Head shape/fang size, effects of their venom, & how they strike



CROTALIDS VS. ELAPIDS



Have retractable fangs, tend to strike quick, inject venom, and withdraw



Have short, fixed fangs that will strike, & "chew" on prey to inject venom

STRIKING MOTIVATIONS

- Defensive bite: Little to no venom released by snake & can be a dry bite
- Dry bite: Bite still occurs but no venom is released by snake *Seen in about 20% of cases*
- Offensive bite: Strike where snake releases a controlled amount of venom
- Agonal bite: Occur when snake is dying & entire venom load is delivered

ELAPIDS

- Cobras most well-known with this species
- Examples in U.S: Western & Eastern Coral Snake, & Yellowbelly Sea Snake
- Venom type: Neurotoxic/Cytotoxic
- Make up <2% of envenomations yearly



Coral Snake



© Dick Bartlett

Yellowbelly Sea Snake

CROTALIDS

- Commonly known as pit vipers
- Examples: rattlesnakes, cottonmouths, copperheads, water moccasins
- Found across the U.S.
- Species responsible for most snake envenomation in small animals & humans yearly
- Venom type: Hemotoxic/Cytotoxic (Exception: Mojave Green & Timber rattlesnakes)



Mojave Green Rattlesnake



Cottonmouth

SNAKE VENOM COMPOSITION

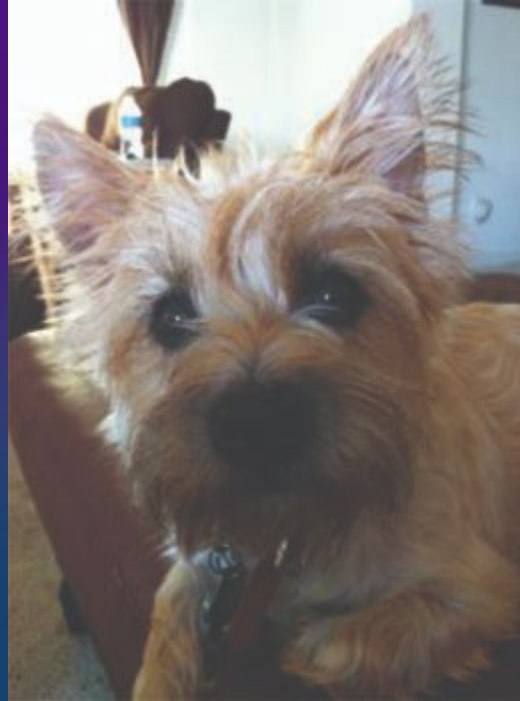
- Venom is comprised of 90% water & 10% enzymes, & various peptides, and proteins
- Purpose of venom is to aid in prey immobilization and tissue digestion
- This is what causes the clinical signs we see in small animals

PATHOPHYSIOLOGY: NEUROTOXIC

- Venom contains alpha neurotoxin, phospholipase A₂, three-finger toxin, and other neurotoxic components
- Inhibit acetylcholine release or binding at the neuromuscular junction
- This interference with the transmission of nerve impulses lead to muscle fasciculations/weakness, paralysis, & depressed mental state
- These potent neurotoxins are spread via the lymphatic system

CLINICAL SIGNS OF ELAPID ENVENOMATION

- Can have delayed onset of signs due to neurotoxic effects
- May see less localized swelling & pain
- Ptyalism, vomiting, weakness, tachypnea or dyspnea, & central nervous signs
- Can progress to further dysfunction such as respiratory paralysis



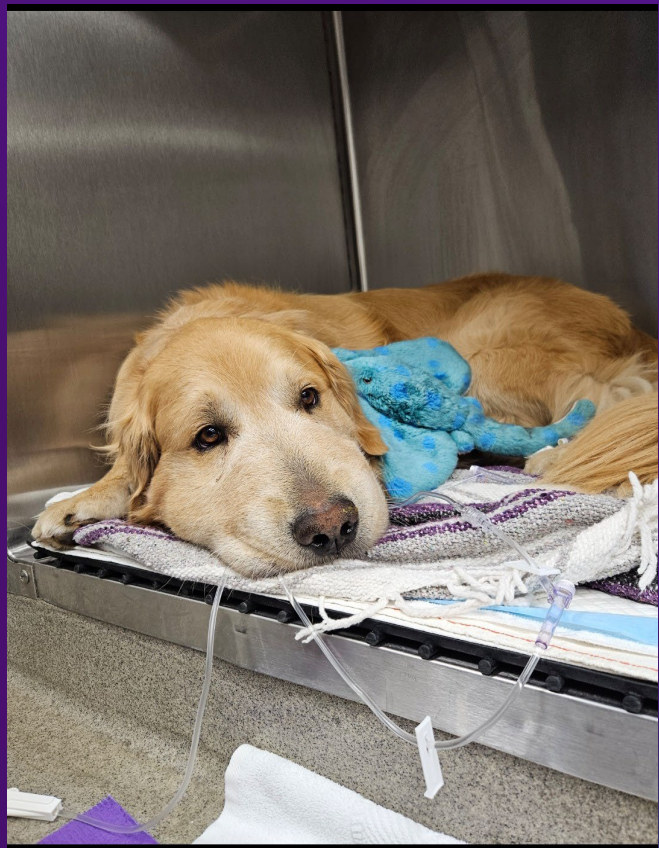
Coral snake envenomation

PATHOPHYSIOLOGY: HEMOTOXIC/CYTOTOXIC

- Venom contains metalloproteinases, crotoxin, and phospholipase A₂, other hemotoxic/cytotoxic components
- Coagulopathies result from hemotoxins: Prolonged PT/aPTT, platelet aggregation, and thrombocytopenia
- Damage to capillaries & endothelial cells: increases vascular permeability
- Damage & abnormalities to the RBCs (echinocytes, spherocytes)
- Tissue & muscle damage & necrosis

CLINICAL SIGNS OF CROTALID ENVENOMATION

- Localized swelling & edema at envenomation site
- Hemorrhagic discharge from envenomation site
- Painful at or around envenomation site
 - May also see limping/lameness if bitten on a limb
- Petechiae or ecchymoses
- Shock signs: hypotension, tachycardia, tachypnea, prolonged CRT, pale mucous membranes
- May have vomiting & diarrhea



Post-antivenom transfusion



Initial presentation



Initial presentation

FACTORS THAT AFFECT SEVERITY OF ENVENOMATION

- Location, depth, & number of bites
- Amount of venom injected
- Species & size of snake
- Age and size of pet
- Co-morbidities present in pet

WHY DOES QUICK TRIAGE MATTER?

- These cases can go VERY BAD VERY QUICKLY
- Efficient triage helps decrease amount of time between bite & treatment
- Snake envenomations may not always present clear cut!

TRIAGE BREAKDOWN: HISTORY

- Ask location history: On a hike? Live in a desert/mountain area?
- Sudden onset of signs within a few minutes to hours?
- Many times, owners won't see actual snake bite: may have heard rattle or "scuffle" (under car, in bushes, etc) or have seen snake in the area
- General time of bite, snake description if possible
- Any current medications or other diseases?

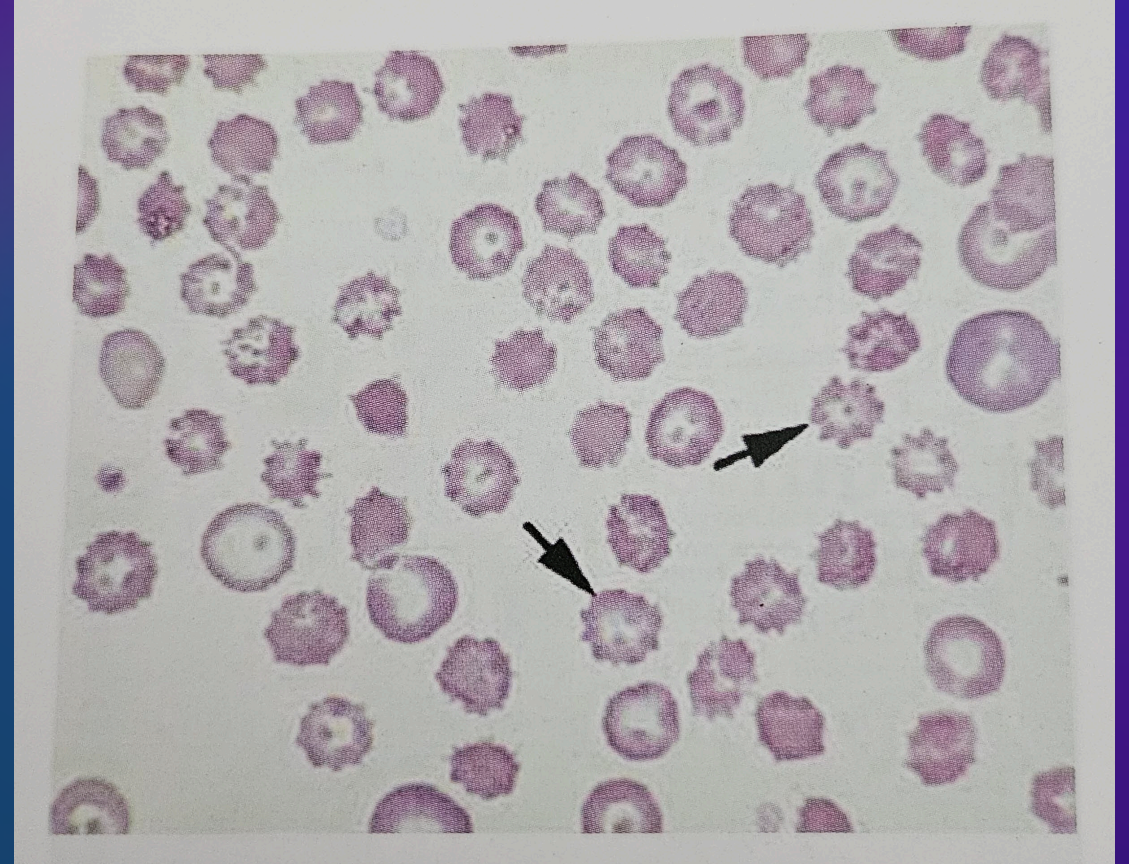
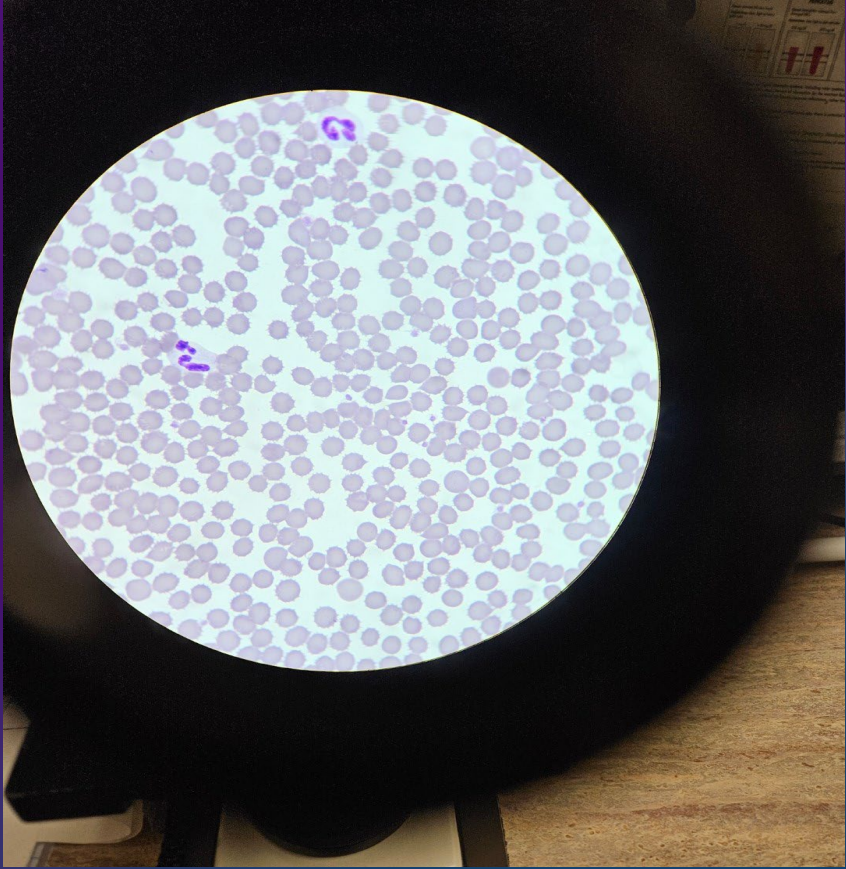
TRIAGE BREAKDOWN: INITIAL TRIAGE

- Vitals:
 - May see tachycardia; can be due to pain or shock
 - Cardiac arrhythmias can be present so utilize ECG if concerned
 - Evaluate quality/ability of breathing; Tachypnea may be seen but if bitten on or around mouth or neck- make sure pet is able to move air appropriately
 - Hyperthermia can be seen
 - Evaluate neurological status
- Check pulse quality & blood pressure
- Evaluate sites for puncture marks, signs of edema, or bruising

TRIAGE BREAKDOWN: LAB WORK

- On presentation pull blood for PT/aPTT (coags), CBC, chemistry, & make a manual BLOOD SMEAR
- Look for presence of echinocytes
- Prolonged PT/aPTT, thrombocytopenia, hemoconcentration, or mild anemia may be seen

ECHINOCYTES



TRIAGE BREAKDOWN: INITIAL TREATMENTS

- Pain meds!
- Intravenous fluids: Help address any hypovolemia, hypotension, & restore normal circulatory volume
- Gentle clip/clean of envenomation site
- Ultimately antivenom transfusion: Neutralizes venom present in body to prevent any further damage.

COMPLICATIONS OF SNAKE ENVENOMATION

- Hemotoxic, cytotoxic, or neurotoxic effects
- Third-spacing of fluids: May result in hypovolemia, hypotension & hypoperfusion (pit viper bites)
- Tissue necrosis at bite site: need wound care/follow-up
- Organ injury damage from prolonged hypoperfusion & damage from toxins themselves
- Death from respiratory paralysis or failure

CASE PRESENTATION: CANELO

- 10yo MN Pitbull presented to clinic about 40 minutes post envenomation
- Initial vitals: Tachycardic at 180bpm, panting, hyperthermic at 104.5, MM: pink & lingual hemorrhage noted
- Also noted to have small necrotic areas located on tongue & had two puncture wounds & edema on right carpus
- IV catheter placed; blood drawn & administered a dose of methadone IV & started IV fluid bolus on presentation
- Blood pressure was being obtained when the bad happened QUICKLY...

CASE PRESENTATION: CANELO



CASE PRESENTATION: CANELO

- Quickly transferred to ICU table
- Sedated with propofol & intubated & placed on oxygen
- Maintained on isoflurane, a fentanyl CRI, & a midazolam CRI
- Started on antivenom transfusion (2 vials total)
- Stabilized & transferred to surgery for a temporary tracheostomy placement

CASE PRESENTATION: CANELO

- Initial labs revealed severe echinocytosis on blood smear, thrombocytopenia, an elevated PT/aPTT, & chemistry WNL
- Portions of tongue became necrotic during stay & were debrided
- Nasogastric tube placed, oral care, tracheostomy care, pain meds, intravenous fluids, & telemetry monitoring throughout hospitalization

CASE PRESENTATION: CANELO

- Hospitalized for 6 days
- CBC, blood smear, & coag parameters normalized
- Tracheostomy tube able to be removed, eating on own with minimal tongue necrosis & normal function
- Discharged as a happy dog :)



Day 2 hospitalization

TIPS FOR SNAKE ENVENOMATION PATIENT CARE

- If very painful/worked up: Give pain meds 1st!!
- Take off all collars & ideally avoid hard e-collars & neck leads
- If bitten around face or front limbs, place IV catheter in back limb as edema/swelling will move downwards
- Monitor changes in puncture sites & wounds
- Keep bedding clean
- Offer softened or wet foods



RESOURCES

- Norkus CL. Veterinary Technician's Manual for Small Animal Emergency and Critical Care. 2nd ed. New Jersey, Wiley-Blackwell; 2019, pp. 267-268
- <https://www.vetmed.msstate.edu/sites/www.vetmed.msstate.edu/files/presentations/2.16.18%20Crotalid%20Envenomation%20In%20The%20Dog%20%28Joshua%20Pierce%29.pdf>
- <https://www.vetmed.msstate.edu/sites/www.vetmed.msstate.edu/files/presentations/4.7.17%20Snake%20Envenomation%20in%20the%20Dog%20%28Adam%20Wagner%29.pdf>
- <https://www.dvm360.com/view/snakebite-in-animals-a-brief-refresher>
- <https://www.merckvetmanual.com/toxicology/snakebite/snakebites-in-animals>
- [https://www.vetsmall.theclinics.com/article/S0195-5616\(11\)00157-4/pdf](https://www.vetsmall.theclinics.com/article/S0195-5616(11)00157-4/pdf)

Questions? Email me!

kaitlin.courtney@vca.com



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