TREATMENT OF ACUTE RATTLESNAKE ENVENOMATION

Case Report
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Signalment: “Chelsea” Rodriguez, 6yo FS Papillon Mix

History:
Chelsea presented to VMSG Emergency following a rattlesnake bite that occurred about 1 hour prior to presentation. The patient was sniffing under a log in Ojai, California when a juvenile rattlesnake bit her on the left side of her muzzle. The bite was witnessed by the owner and the snake was found and confirmed to be a venomous species of rattlesnake. The owner noted immediate swelling of the left muzzle. Chelsea has no other history of disease and was clinically healthy prior to the bite.

Clinical Exam:
On physical examination, Chelsea was bright and responsive. Her temperature was at the upper end of normal (102.4 degrees F) and she was cardiovascularly stable. She had two puncture wounds just ventral to her left naris with local soft tissue swelling involving her left muzzle. Her muzzle was moderately painful on palpation. Despite the swelling and pain, there was no bruising or active hemorrhage from the puncture sites. Chelsea was panting on examination, though eupneic, with normal breath sounds in all quadrants. Her abdominal palpation was unremarkable and she had no peripheral lymphadenopathy.

Laboratory Findings:
Initial in house laboratory evaluation was performed at the time of presentation.
PCV: 55%
Abaxis Chemistry: ALP 456
Blood smear: ~50% population of echinocytes, adequate platelets

Follow up laboratory evaluation was performed following antivenin transfusion.
Blood smear: <10% population of echinocytes, adequate platelets
PT/PTT: 17s, 91s

Repeat evaluation of the blood smear and clotting times was performed prior to discharge.
Blood smear: Sequentially fewer echinocytes, adequate platelets.
PT/PTT: 17s, 84s

Diagnostic Findings:
Chelsea developed rapid and shallow breathing following antivenom transfusion. Her breath sounds were clear. Thoracic radiographs were recommended and obtained.
Thoracic radiographs: Normal thorax

Diagnosis: Rattlesnake bite and envenomation

Treatment/Management:
Initial analgesia was provided with hydromorphone 0.1mg/kg IM. We then administered an antivenom transfusion at an initial rate of 1ml/kg/hr for the first 15 minutes. As no complications or reactions were observed during this time, the rate was increased to ~7ml/kg/hr so that the entire vial could be infused within 2 hours. Chelsea remained cardiovascularly stable and showed no signs of anaphylactic reaction. She developed rapid shallow breathing with normal breath sounds following her transfusion, and thoracic radiographs taken at that time were unremarkable. Following transfusion she had a marked improvement in the percentage of echinocytes on blood smear. Her PT was slightly prolonged though no progressive bruising was noted. The swelling in her muzzle continued to improve over the course of her hospitalization and the percentage of echinocytes on blood smear continued to decrease. Chelsea was discharged with directions to continue tramadol for pain control and close monitoring of her muzzle for worsening clinical swelling, bruising, or pain.

Figure 1: Echinocytes on a canine blood smear

Figure 2: Chelsea happy and healthy at discharge.
Discussion:
There are currently 19 species of venomous rattlesnakes in North America, commonly referred to as Coral Snakes and Pit Vipers. Pit Vipers are more commonly seen in Southern California and therefore more commonly implicated in veterinary medicine. Rattlesnake envenomation in dogs involves release of various toxins that cause tissue necrosis, coagulation abnormalities, and thrombocytopenia. The venom also causes hypotension and hypervolemia through a cascade of events. Uncommonly, a neurotoxin may be released that causes progressive flaccid paralysis and death by respiratory paralysis.

Clinical signs of rattlesnake envenomation can occur immediately with local tissue swelling, bruising, and pain, and can progress within 30-60 minutes or may take as long as 6-8 hours to become evident. In addition to these local effects, patients often develop systemic effects such as tachycardia (likely secondary to pain and hypovolemic shock) and hypotension. As puncture wounds may not be immediately evident on physical examination, the patient should be examined closely for these signs. Other differentials for patients that have developed these signs should include allergic reaction, spider bite, and trauma, though puncture wounds would highly suggest a rattlesnake bite.

The diagnosis of rattlesnake bite and envenomation is highly presumptive, unless the bite was witnessed. The patient should be closely evaluated and inspected for puncture wounds that may or may not have active hemorrhage. Local swelling, bruising, and marked pain will likely be readily appreciated on visual examination and the secondary effects of hypovolemic shock should be found on triage exam as well. Initial blood work to evaluate the patient’s acid base and respiratory status should be performed. A blood smear is also a key diagnostic test. The findings of thrombocytopenia and/or echinocytosis in combination with the patient history and physical exam findings are highly suggestive of a rattlesnake envenomation. An evaluation of clotting times (PT and PTT) prior to onset of treatment is also indicated to provide baseline information to gauge response to therapy.

Initial treatment should be aimed at controlling pain and addressing hypovolemia if present. Early medical therapy and thus immediate presentation to a veterinary facility is of primary importance. The primary treatment that has been of proven benefit is administration of antivenin. Antivenin contains processed antibodies (proteins) that have been formed by other species of animals (horses, sheep) vaccinated with snake venom. These antibodies when infused into dogs work to neutralize venom. Antivenin is administered as a transfusion and because it is a foreign protein, patients should be monitored closely for reactions, such as skin reactions, vomiting, and anaphylaxis. This is the treatment of choice to address patient pain, swelling, bruising or hemorrhage, coagulopathy, and thrombocytopenia as these effects are secondary to the envenomation and toxin release. The administration of additional antivenin vials can be based on the clinical evaluation of the patient (progressive tissue swelling, bruising, necrosis) as well as laboratory tests (prolonged PT/PTT, worsening echinocytosis or thrombocytopenia). Broad-spectrum antibiotic therapy may be indicated in some patients as infection can stem from marked tissue necrosis. However, this is not a first-line treatment for rattlesnake bite cases. The use of corticosteroids in the case of rattlesnake envenomation is highly controversial. There is no published data to support a beneficial effect. The best predictors of successful therapy are improvement in the patient’s clinical signs.

A rattlesnake vaccine, which has been manufactured from the venom of a Western Diamondback, is currently available and has been marketed for use in dogs. Unfortunately, there is no published evidence to support that this vaccine will reduce the severity of the bite and envenomation, or that it will protect from other species of rattlesnakes. Despite a patient’s history of rattlesnake vaccine administration, the owners should pursue immediate evaluation and treatment by a veterinarian in any case of suspected or confirmed rattlesnake bite.

References: