SANCTUARI

Bellamie R. Russo, Board Consultant and Cornell University Bachelor of Animal Science

Spinal Injuries and Self-Mutilation: *Cassandra's Story*

AT A GLANCE

- Animals suffering spinal/nerve damage should be given immediate medical care, including x-rays, to ascertain the exact nature of their injuries.
- Hyperesthesia, a condition associated with increased sensitivity to touch, heat, and/or pain, can occur with nerve damage, and it can induce self-mutilation in Virginia opossums and other species.
- Gabapentin should be administered in proper doses to treat pain and prevent self-trauma. Other drug options include antibiotics, sedatives, and analgesics, subject to veterinary advice.
- Soft barriers like gauze may help stop compulsive behaviors in mild cases. In severe cases, amputation may be considered.
- *Monitor all spinal injury cases very closely*. Rehabilitators should not become complacent upon noting improvements, as these could be temporary and could precede further injury. An opossum named Cassandra with spinal trauma seemed to be improving but then succumbed to injuries from self-mutilation.

Spinal Injuries

Traumatic injury is exceedingly common in wildlife, especially Virginia opossums, with typical causes ranging from animal bites to human-caused woundings, including vehicular collisions. Treatment of neurological damage in opossums is challenging due to gaps in physiological knowledge of their nervous system and in definitive treatment of head and spinal trauma in veterinary and human medicine overall. Considering the dearth of medical knowledge available to opossum rehabilitators and their veterinarians, our recommendations herein are based largely on extrapolation of data from other species, including humans, alongside direct rehabilitator experience.

Self-Trauma Following Nerve Damage

It has been observed in many species (domestics, nonhuman primates, and humans, for example) that self-mutilation may follow neurological damage due to one or several complications. Depending on the location and severity of injury, deafferentation pain, hyperesthesia, or paraesthesia are frequently seen following nerve damage.

Deafferentation pain is defined as the spontaneous occurrence of pain and hypersensitivity to stimuli following interruption of certain neural pathways. Treatment may consist of antidepressant or antiepileptic drugs, surgical intervention, and/or supportive care.

Hyperesthesia, the heightened sensitivity of one or more of the senses, and paraesthesia, the development of tingling and/or prickling sensations in an affected area following nerve damage, may also inspire self-trauma in an attempt to relieve the offending stimulus. Additionally, complete insensation in a given appendage may also inspire self-mutilation, thought to be motivated by a desire to remove the ineffective body part.[1]

Self-mutilation does not always stop with the cessation of the aforementioned physical triggers. In dogs, anxious behavior originating with an injury may continue after recovery, with stress or other factors spurring a lasting compulsion to self-mutilate despite having healed. Sugar gliders have been observed to engage in self-mutilation of the tail and limbs due to underlying conditions such as stress and/or malnutrition. This is perhaps most akin to the opossum's observed cannibalistic behavior under stressful conditions, rather than self-mutilation after an injury. However, treatment for both afflictions is similar. One study in sugar gliders found reduction of stress, antimicrobial therapy, and analgesics to be helpful treatments, while modified Elizabethan collars were observed to deter further injury during healing. In some cases, antidepressants and sedatives were deemed necessary.[2] Naturally, members of different species will have differing sources of stress. For example, isolation is normally no cause for alarm to the solitary opossum but may be anxiety-inducing for many dogs. Regardless of species, eliminating negative stimuli and prioritizing calm during recovery and beyond is recommended for the best possible prognosis.

Spinal Trauma and Virginia Opossums

Dr. Henness of the National Opossum Society (NOS) likened aspects of the Virginia opossum's neurological system to those of humans and domestic species. Due to the opossum's capacity to exhibit spinal shock as in humans, Dr. Henness cautioned rehabilitators to wait at least a week before assessing an individual's loss of mobility and/or sensation as permanent. She warned that opossums often display temporary weakness or paralysis after trauma, but these conditions may be temporary. The state of spinal shock would disable reflexes further down the spinal cord from the site of injury, meaning functionality of affected nerves could not be ascertained until the shock had subsided. Furthermore, nerve damage injuries are not well understood, and recovery of some or all function with time is a possibility in many cases. Severe injury (ex. transection of the spinal cord) is the most predictable exception to this.

Even if a full recovery is never achieved, opossums with partial paralysis or other complications from spinal trauma can still live long and comfortable lives when provided proper care and attention.[3]

Cassandra's Story

A female opossum named Cassandra was surrendered to rehabilitators after a dog attack left her with a spinal injury. She was given gabapentin, though unfortunately the dosage administered was lost by her rehabilitators due to a technological issue. Several days into her recovery, her rehabilitators would check on Cassandra to find her missing toes or the tip of her tail. She soon after was found to have rapidly chewed her tail off entirely, and she had also taken one of her pelvic limbs down to its hock. Extremely discouraged by Cassandra's situation, her rehabilitators tried to dissuade her self-mutilation with vet wrap bandages. Cassandra was also put on antibiotics (likely Clavamox) to prevent infection of her wounds, and possibly Metacam as well, although both the exact antibiotic used and whether Metacam was administered is unknown for the same reason as above. Over the course of the next 3-4 weeks, Cassandra seemed to stabilize and was steadily healing. However, tragically, she suddenly and unexpectedly resumed her self-mutilation, passing away upon completely removing her other back leg. Her rehabilitators estimated that Cassandra's behavior was due to a lack of sensation in her hind end due to her spinal injury, but upon hearing her story much later, a Sanctuari-affiliated veterinarian hypothesized that she was most likely experiencing hyperesthesia in her tail and back legs. Again, there is clinical evidence to support self-mutilation as motivated by either deafferentation pain or a desire to remove insensate appendages, and so either scenario is plausible.[1]

Treatments

Though the above treatments alone were not enough to deter Cassandra, administering gabapentin to opossums with spinal injuries, especially those exhibiting behavior that may precede severe self-trauma, is the best current option for preventing further injury. One study on feline hyperesthesia found significant success in treating with gabapentin alone or in combination with antibiotics, barbiturates, and/or antidepressants.[4] Additionally, the veterinarian cited above advised gabapentin as the most likely treatment to relieve hyperesthesia. Appropriate dosing, frequency, and duration of treatment is subject to the details of each individual case and should be specified by a qualified veterinarian.

As anxiety is thought to be a compounding factor of self-mutilating behavior in many species, other medications used in domestic species include selective serotonin reuptake inhibitors (SSRIs) to treat the compulsive component of self-trauma. Examples include Prozac® (fluoxetine), Zoloft® (sertraline), and Clomicalm® (clomipramine).[5] Data on use of these in opossums is of course not available, though Dr. Henness did recommend use of Valium® (diazepam) in opossums as a sedative.

In addition to medication, reducing stress by other means wherever possible, and the use of physical methods of treatment, may be successful in preventing self-trauma in the opossum. Elizabethan collars may be tried, but these often become a source of frustration and anxiety for the animal and should

be attempted only when necessary.[5] Milder cases of hyperesthesia in other species are sometimes relieved by soft barriers such as gauze wrapped around the affected area, which may discourage mutilation.[1] In the unfortunate case that an opossum does not respond to medication or soft barriers, amputation of the hyperesthetic areas may need to be considered to save the animal's life.

Takeaways

- Spinal injuries in opossums require constant care and attention.
- Trauma of this type must be confirmed with x-rays to determine the exact location and nature of injury.
- Any signs of compulsive grooming or excessive attention to select areas should be immediately addressed with medication and/or physical barriers (gauze, Elizabethan collars).
    - Gabapentin should be used to treat pain and discourage self-mutilation due to hyperesthesia or similar conditions.
    - Soft barriers such as gauze and/or vet wrap may be sufficient to deter self-trauma of hyperesthetic areas in mild cases.
    - Amputation, where possible, is a last resort for opossums that do not respond to alternative treatments.
- Monitoring is the most important action to prevent further injury.
    - If rehabilitators find themselves stretched to capacity, spinal injury cases should be given priority.
    - Video surveillance systems or additional help should be considered.
- False positives are common in recovery and should never be trusted to mean an animal is "out of the woods." Spinal injuries should often be regarded as if they will never fully heal.
- Stress may exacerbate self-mutilation tendencies and should be reduced wherever possible, not only during recovery but over the animal's lifetime.

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