Exotic snakes are not always found in exotic places: how poison centres can assist emergency departments

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Emergency departments throughout the USA may have some familiarity with the management of envenomation from indigenous snake species such as *Crotalinae* (rattlesnakes) and *Micrurus* (coral snakes). However, venomous species may include exotic reptiles whose bites pose substantial treatment challenges due to both a lack of experience and the difficulty in obtaining antivenoms. Two pet cobra envenomation incidents illustrate the challenges that face emergency departments, especially in urban settings, that are confronted with these exposures. It is important for emergency departments to be aware of the large underground presence of exotic venomous reptile pets and to utilise the expertise of regional poison centres that will also assist in the procurement of exotic antivenoms.

The trade in exotic creatures, second only to drugs and weapons on the international black market, makes the presence of exotic venomous snakes possible in every country of the world. This industry is estimated to be worth at least \$15 billion (£7.5 billion, €11 billion) annually in the USA alone.¹ Approximately 3% of US households harbour 7.3 million pet reptiles, with snakes being the most common, but few records exist as the majority of US states do not have accurate record keeping regarding the ownership of these animals.²

Owners are often amateur snake-keepers and are at risk for envenomation from their pets. The World Health Organization estimates that worldwide there are 2.54 million venomous snake bites with 125 000 fatalities annually.³ Each year in the USA, 50 000 snake-bites are recorded, 7000 of which are envenomations, resulting in 15 fatalities.² In 2005, the American Association of Poison Control Centers' (AAPCC) National Poisoning and Exposure Database recorded 240 exotic snake bites resulting in eight patients with major outcomes (defined as disfiguring or life-threatening).⁴

Rattlesnakes and copperheads (*Crotalinae*), and coral snakes (*Micrurus*) are indigenous to the USA and the management of envenomation from these species is familiar to many emergency department staff. However, exotic snake bites present substantial treatment challenges to the emergency department due to a lack of experience and familiarity with exotic snakes. This is compounded by the difficulty of obtaining the necessary antivenoms for patient management. The rarity of such exposures does not make them a high priority issue in emergency

departments and it is easy to become complacent about such issues. Two pet cobra envenomation incidents described below illustrate the challenges that face emergency departments when confronted with these exposures and how poison centres can help to resolve those challenges.

CASE REPORTS

Case 1

A 23-year-old woman presented to the emergency department after being bitten on the buttock while cleaning the cage of a monacled cobra (*Naja naja kaouthia*). The patient was asymptomatic initially and had a small double puncture wound at the bite site, with no swelling or bleb formation. She was admitted to the intensive care unit for observation. The baseline coagulation panel was within normal limits. The incident occurred on a weekend day, very early in the morning. The regional poison information centre was consulted to assist in the procurement of antivenom and in 35 min Saimarr polyvalent cobra antivenom was located at a major metropolitan zoo and was transported via medical helicopter to the treating facility within 5 h. The patient became symptomatic with diplopia and dysphagia at 8 h post-exposure and was sedated, intubated, ventilated, and one vial of antivenom was administered. The toxicologist treating the patient consulted with an exotic snake envenomation specialist and an additional nine vials of antivenom were administered along with hydroxyzine and diphenhydramine. The patient completed the course of antivenom treatment and was extubated 30 h post-exposure. Coagulation studies remained normal and the wound site developed a small necrotic

area but no debridement was necessary. The patient was discharged 3 days after admission.

Case 2

Three weeks after case 1, a 44-year-old man was bitten by his pet monacled cobra (*Naja naja kaouthia*). The emergency department staff contacted the regional poison information centre. Since the recent cobra envenomation involved the same species of snake, arrangements were made to fly the supply of antivenom from the zoo identified in case 1 to the treating facility within 35 min of the initial call. Upon admission, the patient had mild swelling at the envenomation site on his left hand. He was treated with five vials of Queen Saovabha monovalent antivenom. Coagulation studies were normal. The patient was observed in the intensive care unit for 24 h and discharged the following day.

DISCUSSION

The US imports two million live reptiles annually and exports nine million in a multibillion dollar industry that has limited regulations for private owners.⁵ Snakes are the most common "pet" reptile. Exotic snake ownership includes individuals from every walk of life and for a multitude of reasons, from professional (medical research) to religious (ceremonial) to personal (family pets). Over 1000 internet sites exist where information on exotic pets may be obtained and creatures may be purchased.² Thus, the public has easy access to a wide array of potentially dangerous creatures. Exotic snakes may be dangerous to their keepers, as well as to neighbours and communities if they escape or are discarded. Snakes are often sold as hatchlings and as they mature, their owners may find themselves confronted eventually with a large snake that may outweigh them, eat live prey and live for 20 years.⁵ In addition to envenomation from an exotic snake, there are other associated problems with snake ownership. As common carriers of salmonella, there is the potential for transmission of disease from pets to owners. In 1999, the Centers for Disease Control and Prevention issued a public advisory that 9300 people per year contract salmonella from reptiles and amphibians.⁵ Furthermore, keeping exotic snakes in captivity is expensive. The purchase price of snakes ranges from \$100–\$1000 (£50–£500, €73–€730) or more and annual expenses for food and habitat needs can be hundreds of dollars.⁶ There are multiple international

herpetological societies and clubs in existence that can provide information and training to keepers, but there are no requirements for owners to register their exotic pets or to utilise these resources.

The US government does not mandate quarantine, inspection or tracking of movements of exotic creatures designated for the pet trade.¹ Limited legislation regulates the ownership of exotic creatures in the USA. Only three federal regulations exist: (1) the Endangered Species Act which stipulates that it is illegal to possess, sell or buy an endangered species, but does not regulate private possession; (2) the Public Health Services Act which regulates the trade of non-human primates; (3) the Lacey Act which allows the US government to prosecute a person in possession of an animal obtained illegally in a foreign country or another state. It does not regulate private possession. State and country laws vary regarding ownership of exotic creatures. Some countries ban possession, some have a partial ban of specified creatures, while others require a licence or permit or simply require a certificate stating that the animal was obtained legally. Local laws vary. Some have ordinances that regulate or ban the ownership of exotic creatures.² While laws are in place to govern aspects of exotic pet ownership, they are difficult, if not impossible, to enforce.

When indicated, antivenom is the only specific antidotal treatment for envenomation by an exotic poisonous snake, and other treatment is supportive. Symptomatic intensive care is often necessary due to the lack of familiarity with exotic snake management and because antivenom may not be available. It is unusual that an emergency department would stock exotic antivenoms and the regional poison centre should be contacted immediately by the emergency department staff to determine the

necessity of using an antivenom and how to procure it.

There are no domestic producers for *Elapidae* antivenom. These are manufactured by companies in South Africa, Iran, India, Pakistan, Thailand and Saudi Arabia. There are numerous challenges regarding the procurement of exotic snake venom. They are difficult to obtain commercially due to US Food and Drug Administration requirements and strict import regulations. Furthermore, it is hard to justify stocking exotic antivenoms financially since there is no registry of exotic venomous snakes, making it impossible to determine what exotic antivenoms may be necessary within a community. Therefore, zoos that maintain collections of exotic venomous snakes are the best resource to utilise when an envenomation occurs.

Poison centres should be utilised by emergency department staff to assist in the procurement of exotic antivenom, and though this may be a rare case managed by an emergency department, it is critical to have established protocols in place before such an event occurs to prevent a delay of treatment. Resources such as the Antivenom Index, available online at the AAPCC website (www.aapcc.org), local zoo reptile specialists and national envenomation experts are available to assist in these cases, but the regional poison centre is best prepared to assist emergency department staff in the management of these rare but challenging cases.

CONCLUSIONS

Most snakebites in the USA are expected to be native species of *Crotalinae* or *Micrurus*. It is rare for an acute care medical facility to treat patients who are envenomated by exotic snakes. But with a large exotic pet trade worldwide and with easy

access to such creatures on the internet, it is likely that an emergency department will be confronted with this scenario. The poison centre should play a pivotal role in assisting with treatment recommendations and locating exotic antivenom. Early treatment is critical for good outcomes and it is crucial for emergency departments to be aware of available resources and to establish guidelines to manage these exposures.

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