Snakebite, Part 1: Copperhead in the Bamboo

A three-part series on poisonous snakes of Virginia by David Maurer, The Daily Progress.

Orginally Posted: Monday, June 18, 2012 1:23 pm by The Daily Progress

Photo: Dave Maurer's left arm on May 14, two days after the snakebite, still shows significant swelling. Emergency medical personnel made a series of marks on his arm to track the progress of the swelling.

I recently had the good fortune to be bitten by a copperhead snake. Of course, I wasn't seeing it that way as I lay in Martha Jefferson Hospital with CroFab antivenin coursing through my veins and my left arm swelling to Popeye-esque proportions. It was only after the considerable pain, bruising and swelling had subsided that I started to have a more enlightened take on my experience with envenomation. My awakening came as I learned fascinating facts about the poisonous snakes indigenous to Virginia — copperhead, cottonmouth and timber rattlers — and the blessings of modern medicine.

My encounter with the copperhead occurred around 9 a.m. May 12. That Saturday morning, I was topping a stand of bamboo that grows under the power lines leading to my Albemarle County home. I was using short-handled clippers and had reached into a clump of bamboo to lop off a long shoot. I felt an unusual pain on the inside of my left wrist that made me think I had stabbed myself on a sharp piece of bamboo. My second thought was that I had somehow gotten a cramp in my wrist. I quickly changed that assessment when I saw the two small puncture marks just above my work gloves.

In one of those remarkable displays of the brain's recall ability, I immediately pictured the U.S. Army Special Forces instructor who had given my class a lesson on poisonous snakes during my training in

the mid-1960s. His first remark on what to do if bitten: “Don’t panic. You’re probably not going to die, but get medical attention as soon as possible.”

I took him at his word. Being dirty and sweaty, I showered, changed clothes and made sure my dog had plenty of food and water. All this took about 10 minutes, and in that time the swelling above the red bite marks had become noticeable. The pain was also increasing, but nothing I would term excruciating. I called my primary physician, Dr. John Lanham, who told me to come right in. He has had experience with snakebites from his time practicing medicine in a remote area of Sudan. It took him about 10 seconds to assess the situation and send me off to MJH’s emergency room.

“The nature of the venom is hemorrhagic, and that’s why you had the bruising,” Lanham said. “Some of the venom ruptures red blood cells and some of it lets the blood leak out, which causes the swelling.

“Then there’s also certain types of enzymes that cause local tissue necrosis. It was primarily the pain you were experiencing and the local swelling that had already occurred that got you out of here and to the emergency room pretty fast. “It looked like there was more going on than just the pain from the strike.”

Aside from the pain, which had escalated to a burning sensation along the length of my left arm, I felt fine. I had no problem driving the few miles to the hospital. At this juncture, I already had learned two valuable lessons.

> The first: During warm weather, never put your hands or feet into grass or bushes where you can’t see where they’re going.
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> Secondly, never assume the snake is going to be on the ground. The copperhead that bit me was at least 5 feet up in the bamboo.

I never saw the snake, but it had to have been small in order for the bamboo to support it. I asked Larry Mendoza, president of the Virginia Herpetological Society, if it’s true that getting bitten by a young snake is the worst.

“Yes and no,” Mendoza said. “The young ones can’t control the amount of venom they inject. “Whereas the adults can control their venom load, and some can even give you what is called a ‘dry bite,’ where no venom is injected. So if you get bitten by a young one, you will get envenomated. “The good news is that the young ones don’t hold as much venom as the old ones.”

Victoria Brianna Hovey was bitten twice by a young copperhead on May 22. It was the day before her 12th birthday, and she was visiting her sister in Stanardsville. “I was in the driveway getting ready to

get in the car when I startled the snake, and it bit me," Victoria said recently as she recovered in her Greene County home. "I screamed, and when I jumped back, I stepped on its tail and it bit me again [on the other leg].

"It felt weird, like a pinch. My sister's boyfriend tore his shirt in two and tied it around my ankles so the poison wouldn't go up my leg, and then he called [emergency]. "They told him to take the shirt off [the ankles] and get me to the hospital."

Dr. Christopher P. Holstege, director of the Blue Ridge Poison Center at the University of Virginia, said applying a tourniquet is an absolute no-no. So are other widely believed practices.
"There's so much misinformation about first aid for snakebites, even from somewhat reliable sources," Holstege said. "I've seen probably more harm done by cutting and tourniquets than from the snakes themselves. Before we had good studies on this, people would do some very crazy things. They would put tourniquets on with the thought it would keep the venom in one place, but this does more damage than good."

"People would cut open the site of the bite and try to suck out the venom. We know suction doesn't work at all, and, in fact, studies have shown it does more harm. "Many of the snakebites we see are on the feet and hands. If you cut in those areas, there's a good chance you'll cut tendons, nerves or other structures."

Cutting the proverbial "X" at the site of the bite only creates a more serious wound and greatly inhibits healing. And not only is it impossible to suck the venom out, but the attempt can deliver bacteria from the mouth into the wound or venom into the mouth.

"The venom goes into the subcutaneous tissues, so you're not going to get it out by sucking; you're just not," Holstege said. "There's a number of snakebite kits on the market, and I'm absolutely appalled they're allowed to sell them.

"In the kits are a suction device, scalpel and a shoestring you can use for a tourniquet. All the things we know that cause harm and don't work. We now know that even applying ice to the swelling does more harm then good. You think because there's swelling, ice would be a benefit, but studies show that's not the case."

Mendoza said another danger of a snakebite kit is that it gives a false sense of security to the user. "You think your snakebite has been treated and it hasn't," Mendoza said. "The best snakebite kits are car keys and the nearest hospital."

Next: Treatment.

Snakebite, Part 2: The journey of antivenin

When the hollow fangs of the copperhead snake pierced my left wrist, they did more than ruin my day.

The instant the yellow venom began blazing a destructive path up my arm, I became part of a painful and often deadly narrative. A narrative that goes back to the dawn of man.

The bite also made me grateful to a host of champions who use microscopes and sophisticated medical machinery in their fight on behalf of snakebite victims. Because of them, I was able to avoid a physical outcome that could have been much worse than it was.

Several thousand people are bitten by venomous snakes each year in the U.S., but deaths have become exceedingly rare. This is largely due to excellent medical care and the availability of CroFab antivenin.

Dr. Christopher P. Holstege, director of the Blue Ridge Poison Center at the University of Virginia, says Dr. Findlay E. Russell is the grandfather of antivenin. His pioneering work, started in the early 1950s, led to the introduction of an antivenin in the 1970s.

The Wyeth antivenin battled the effects of copperhead, cottonmouth and rattlesnake bites. It was derived from antibodies produced in horses that had been injected with diluted quantities of venom.

This first generation of antivenin worked, but it proved problematic.

"When I gave the Wyeth antivenin, there was a risk of it causing an allergic reaction and possible death in my patients," Holstege said. "So we really had to weigh who got it.

"The CroFab antivenin we have now is derived from sheep and is much safer and a real blessing. They take the venom from four snakes -- Eastern diamondback, Western diamondback, Mojave and the cottonmouth.

"They picked these four snakes, because the Eastern and Western diamondback are exceedingly dangerous and certainly can cause death. The Mojave can actually cause paralysis, and the cottonmouth is in the same group as the copperhead."

CroFab antivenin is made by BTG International Ltd., a healthcare company based in London. It specializes in producing niche medicines, and in 2000 the Food and Drug Administration approved its CroFab antivenin for use in the U.S.

"Our antivenin has been used in thousands of individuals with good effect," said Emmanuel Mahlis, vice president for medical affairs at BTG. "The feedback we're getting, and what we've seen all along, is that there's been a lot of improvement [when compared to] the previous antivenin.

"We're getting individuals such as yourself who have gotten in touch with us to basically say, 'Thank you. Were it not for your product I may have been without the use of a limb or, potentially, dead.' "

Creating CroFab antivenin is a complicated, multi-step process that takes nearly a year to complete. Terry Prime, vice president of marketing for BTG, explained how it's made.

"First, four different species of snakes are milked to get the venom, and that's done in the U.S.," Prime said. "The venom is then sent to our facility in Wales, where it's made into a serum that can be injected.

"That serum has a little venom in it, but not enough to do harm. That serum is sent to Australia, where we have a big farm with flocks of free-range sheep.

"The sheep get an injection of the serum, and during a period of months, they develop antibodies for the little venom that's in their bodies. A little amount of blood with the antivenin is taken from them periodically and sent back to Wales where it's made into CroFab antivenin."

The final packaging of CroFab antivenin is done here in the U.S.

Mahlis said that by using sheep, the company can decrease the amount of cross reactions with other bacteria or microbes.

"The sheep are not harmed in any way, and are obviously very valuable assets," Mahlis said. "There are veterinarians on the staff, and even when we bleed them for the antivenin it's no more harmful than when we go to our doctor for a blood test."

The downside of CroFab antivenin is its cost. One vial can cost more than $1,000, and there are good reasons for the hefty price tag.

"As you can imagine, a product this complicated took a while to go through all the clinical development and approval at the FDA," Prime said. "There's also the complexity of the manufacturing process and dealing with different countries.

"And when you look nationally, there aren't that many cases of people getting bitten by [venomous] snakes, as compared to something like diabetes or hypertension, where it's widespread. In the Northern states and in big cities, you rarely see snakebites.

"Continuing to go through this complicated process to produce the product for a fairly small number of people contributes to the cost. We've done work to help improve reimbursement of the product by insurance companies and government programs.

"We went to the centers for Medicaid and Medicare services about two years ago to apply for a reimbursement code, which was approved. We're constantly looking for ways to help make sure patients in hospitals can pay for the drug."

I initially was given four vials of CroFab antivenin. Hours later, when the swelling hadn't decreased, I was given four additional vials.

As costly as it is to treat a venomous snakebite, not treating it can cause great damage or death. One of the major functions of venom is to digest tissue, so the sooner you get the antivenin, the better.

"Two things you may see if you're bitten by a copperhead and don't seek medical care [are] more tissue damage and more swelling," Holstege said. "If bit on the wrist, as you were, the swelling can go all the way up to the shoulder, where the lymph nodes are.

"You may get necrosis or more tissue breakdown at the site of the bite, so that it becomes black and dies off. The natural course, and we'll see that at times when people have delayed coming in, is that the affected extremity becomes extremely swollen.

"Too much pressure can cause damage to tissue, too, and decrease blood flow to the extremity. If you're bitten on a finger, that finger may become black, and you can lose it."

Holstege said the timber rattlesnake is particularly dangerous, because it has an additional toxin in its venom that interferes with platelets and causes their numbers to drop. The loss of enough platelets can cause patients to bleed significantly into their tissues, which puts them at risk of death.

I fortunately got to Martha Jefferson Hospital within an hour or so of being bitten. My attending physician, Dr. Brian A. Whittaker, quickly assessed my condition and established communication with Blue Ridge Poison Center, and they collaborated on my treatment.

I ended up spending about 22 hours in the hospital. My vital signs were monitored closely, and the attentive staff ensured I was as comfortable as possible during my stay.

One often hears of the "excruciating pain" associated with the bite of a venomous snake. Pain is something that is going to vary from person to person, but I can say the pain I experienced was of the type you make rapid accommodations for.

A month and a half after my encounter with the copperhead, the swelling is gone, and only the area near the bite marks is still a bit tender. Thanks to many people I'll never meet, and a number of people I have, I'm well on my way to a full recovery.

Next: A primer on the venomous snakes of Virginia.

Snakebite, part 3: A healthy respect for snakes.

If I had seen the copperhead snake that bit me the morning of May 12, I would have killed it.

I would have been wrong.

It certainly would have been a crime against Mother Nature, and possibly a crime under Virginia law. Here in the Commonwealth, snakes are protected under non-game regulations.

According to the Virginia Department of Game and Inland Fisheries, killing snakes is not a permitted activity. However, if you find a copperhead in your home or garage, you have the legal right to kill it. The individual "is allowed to take some action to protect livestock or family."

I won't deny having an instinctive urge to dispatch venomous snakes whenever and wherever I see them. But I now know that the commonly held belief that the only good snake is a dead snake is neither right nor rational.

Snakes play a vital role in nature by helping to keep insects and disease-carrying rodents like mice and rats in check. VDGIF says millions of dollars' worth of crop damage is avoided every year because of the pest control service snakes provide.

"Ecologically, snakes are very important in keeping a balanced system," said Larry Mendoza, president of the Virginia Herpetological Society. "This is really an education issue, and our website, www.virginiaherpetologicalsociety.com, is a great resource to learn about the snakes of Virginia.

"My message is to take some time and learn about these wonderful animals. There's beauty in these creatures -- even the scary ones."

VDGIF has created "A Guide to the Snakes of Virginia," which is available for purchase at www.huntfishva.com. "Snakes of Virginia," published by the University of Virginia Press, also is an excellent reference book, but some of its information on first aid for snakebite is wrong and outdated.

Of the more than two dozen species of snakes native to Virginia, only the copperhead, cottonmouth, timber rattlesnake and its variant, the canebrake rattlesnake, are venomous. The cottonmouth and canebrake rattlesnake usually are found in the southeastern part of the state.

Mendoza said the cottonmouth is a semi-aquatic snake that's most often found in or near water. Timber rattlers are generally found in the mountains. Copperheads are distributed statewide, and usually will be found around wooded, rocky areas and near water sources.

"Copperheads like to eat mice, frogs, toads, salamanders and things like that," Mendoza said. "A lot of times when they're in your yard, it means there's food sources there.

"I always recommend that people make sure their yards are clear of any debris or junk that attracts mice. If there's one snake around, chances are good there is going to be a number of them.

"But it's very rare that a venomous snake you find in your yard is actually living there. Like any other wildlife you find in your yard, they usually stick around for a little while, but end up leaving."

Mendoza said sealing off access points in the foundation of a house is a good way to keep snakes out. He said what doesn't work are things like mothballs or so-called snake repellent products.

All the venomous snakes in Virginia are members of the pit viper family. This helps in identifying them, because they have heat-sensing pits between the eyes and the nostrils.

"Here in Virginia, our venomous snakes have vertical pupils that look like cat eyes," Mendoza said. "Whereas our nonvenomous species have circular pupils.

"The triangular head can sometimes help in identifying our venomous snakes. But there are a lot of snakes that have heads that are angled in such a way that they look triangular.

"Recognizing the patterns on the body is another way to identify them. The copperhead has what is called a saddle pattern, and can be brownish in color to a copper or reddish tint.

"Cottonmouth are darker in color and have banding patterns. They also have the distinctive white color inside their mouth, which gives them their name."

Rattlesnakes get their name because of the rattle on the end of their tails. They will usually make a "buzzing" sound with their rattle when disturbed, but if surprised they've been known to strike without warning.

"There's nothing worse during a hike, and I've had this happen, when you hear the rattle and you're not sure where it's coming from," said Dr. Christopher P. Holstege, medical director of the Blue Ridge Poison Center at the University of Virginia.

"If you find yourself in this situation, stop, and don't take another step. Look around to see where the snake is at, and then back off.

"Don't go after the snake to kill it. Most people are bitten when they try to kill a snake, pick it up or do something silly with it.

"By far the most common snakebite scenario is someone who is drinking alcohol and wants to pick up a snake. Their reaction time is slow, and the snake's reactions are very fast."

Snakes are extremely sensitive to vibrations and can detect them in the ground and even through things they're resting on. They certainly can pick up vibrations caused by footsteps, and most likely will try to move away.

Mendoza said a common misconception he hears regularly is that a snake, often a cottonmouth, has chased a person.

"No snake is going to chase a human, for a number of reasons," Mendoza said. "The last thing they want to do is get in a fight with this huge mammal.

"A lot of times when people see these guys, the snake is startled and is just trying to get away. Snakes are nearsighted, so a lot of times when they're moving toward a person, they're actually trying to get away in any direction they can.

"I don't believe there's any such thing as an aggressive snake. There's only a defensive snake."

Snakes are active in the spring, summer and early fall. All snakes hibernate during the winter, but Mendoza said if it's a mild winter, it's not uncommon to see them in the middle of January or early February.

Snakes can be active day or night, depending on the temperature. When temperatures are high, they tend to be more energetic at night.

Pit vipers prefer to strike from a coiled position, but it's not necessary. According to "Snakes of Virginia," when these snakes are in the coiled position, they can strike for a distance up to half their length.

Mendoza said snakes rely on camouflage and often will remain motionless in order to avoid detection. These traits can prove especially dangerous for children.

"A young child might reach out to pick one [snake] up, either from curiosity or because it looks just like a toy," said Kristin L. Wenger, education coordinator for Blue Ridge Poison Center. "Parents and caregivers should teach children to never handle snakes, or spiders, or any critter for that matter, they find in the yard or the forest.

"Children should also be taught not to taunt or tease a snake, nor to attempt to kill it. Adults should follow this advice as well. Many bites could be avoided if the victim just left the snake alone."

My encounter with the copperhead snake reanimated some primitive survival instinct in me. Prior to the bite, I had been on the alert for snakes only when running trails or stepping over logs while hiking.

That was a mistake. Because I live in prime copperhead country, I now scan my front porch through the screen door before going out.

I check the driveway as I head toward my vehicle, and before getting out of it. I'll never again reach into a bush or bamboo thicket without first rustling it up with a stick.

Being guilty of having wantonly killed copperheads in the past, I have only one thing to say to them: We're even.