



RESPIRATORY THERAPY'S ROLE IN THE TREATMENT OF CORAL SNAKE BITES

by (the late) Steven Grenard RRT, RPSGT

For decades, respiratory therapists in the U.S. rarely have been involved in the management and treatment of venomous snakebites due to the availability of effective antivenoms for neurotoxic coral snake bites. When given promptly, these substances neutralized the Coral snake's venom and preclude the development of neurotoxic symptoms, including respiratory paralysis.

Although there are several species of coral snakes in the U.S. it is those found from the tip of coastal northern Florida to North Carolina, and westward through Alabama and Louisiana. Another Texan subspecies of this same snake is the most problematic when it comes to respiratory paralysis. Bites by the Western Coral Snake, an entirely different species, have never been covered by antivenom because they are not known to cause potentially fatal respiratory failure.

Wyeth Pharmaceuticals, the company that provided the Eastern Coral Snake antivenom, decided several years ago to suspend manufacturing it for reasons the company has neither released nor confirmed publicly. After Wyeth suspended manufacture, there were several years worth of coral snake antivenom available that didn't expire until Fall 2008. The company, with agreement from the Food and Drug Administration, has extended the expiration date by one year, meaning that any available antivenom could not be used after Fall 2009.

Venom researchers in Texas are now studying a possible Mexican substitute for Wyeth's coral snake antivenom, but if or until it becomes available, RTs in areas where Eastern and Texas Coral snakebites occur need to become aware of some of the issues surrounding this type of bite. Fortunately, if victims of such snakebites are transported rapidly to a hospital, it is not the end for them just because there is no antivenom available.

In a 1987 edition of the Journal of the American Medical Association, Kitchens and Van Mierop reviewed 39 cases of Eastern Coral (*Micrurus fulvius*) snake bite that occurred in Florida. Twenty of these were personally treated by the authors in the Gainesville area, and the authors consulted by phone on the other 19 cases. These physicians listed the following early signs and symptoms in order of their frequency: fang marks, local swelling, paresthesias, nausea, vomiting, euphoria, generalized weakness, dizziness,

diplopia or double vision, dyspnea, diaphoresis, muscle tenderness, fasciculations and mental confusion.

The above are early symptoms of this type of bite and indicate that envenomation probably has occurred. More advanced neurotoxic symptoms may include ptosis of one or both eyelids, inability to hold the head up, inability to shift gaze, reduced negative inspiratory force, slurred speech and difficulty swallowing.

If appropriate Eastern Coral snake antivenom were available, any one or more of the early symptoms would indicate its administration. The fatal sequelae of this type of bite are bulbo-spinal paralysis, including respiratory paralysis. Because it may be unlikely that specific antivenom for this type of snakebite will be available after next Fall, physicians and RTs must consider elective endotracheal intubation and mechanical ventilation before the onset of the more advanced symptoms.

Of special importance in coral snakebite is the fact that the advanced symptoms may not occur for up to 12-plus hours after the bite. This delayed onset may give attending medical staff false confidence that the bite was either non-venomous or inconsequential.

Dry bites also are known to occur. This would conceivably be a serious mistake. More than a 12-hour delay in the onset of serious symptoms in the past has often allowed plenty of time for transport to a hospital and administration of coral snake antivenom. Therefore, respiratory therapists have rarely been involved in the longer term management of such cases.

Among the factors we don't know with certainty is how long most coral snake victims require eliminating the venom and its effects when antivenom has not been given. Due to the rarity of such cases, weaning procedures and protocols are nonexistent. Should an RT be faced with such a case, it may require writing new protocols and the chance to report them in the literature.

Venom toxins eventually may be neutralized by the body's own immune system and antibodies, and in some types of snakebite venom is removed by the kidneys and excreted in the urine. Therefore a mechanically ventilated coral snakebite victim is not apt to be a long-term situation, but we just don't know exactly how long recovery might take without antivenom.

IN MEMORIAM

It is with profound sadness that FOCUS announces the passing of Steven Grenard RRT RPSGT, a veteran and pioneer in the fields of Respiratory Care and Sleep Medicine on April 6th, 2009. This issue of FOCUS Journal features what we believe to be the last two articles authored by Steve (second article found on page 32). Steve Grenard was a role model, mentor and personal friend for many years who contributed mightily to FOCUS Journal as a regularly featured columnist. Our condolences go out to his family. We can categorically say that the Respiratory Care and Sleep professions owe a tremendous amount to Steven Grenard. Rest in Peace Steve.
Bob Miglino RRT BSRT MPS - Publisher

scientific poster and, in addition, we offered to anyone who made the request the entire lecture series of Sleep and Dreams and the course text, Stanford Sleep Book, entirely free of charge. The number of takers can be counted on the thumb of one hand.

To be sure, a small number of people around the country have developed undergraduate courses. A few years ago, a publishing company did a survey of more than 4,000 colleges and universities. At that time, they found only three that presented a comprehensive curriculum. There were courses on all aspects of sleep, a fair number of modules about dreaming in psychology curricula, but nothing comprehensive.

Starting in 2006, I conducted a survey about prior exposure to sleep-related knowledge in high school. The results confirmed the ongoing near-complete failure to deliver sleep knowledge at the high school level. Fewer than 2 percent of students who participated in the survey (approximately 2,000) said that they had learned about sleep in high school. Assuming that Stanford undergraduates are recruited from the top tier of high schools, it would seem possible that the national level is much lower than 2 percent.

Top down education, which is education of sleep professionals and physicians, should be continued; however, the gigantic population of people with sleep disorders who need diagnosis and treatment will not be reached until sleep education is a required part of the mainstream educational system.

How can this be accomplished? It seems likely that current efforts should begin with state legislators who, in most states, have the authority to mandate what is taught in public high schools throughout their state. Given that more high school students than ever are learning to drive, and that these students should be alert in class for optimal learning, effectively transmitting knowledge about sleep, sleep deprivation and sleep disorders should be a required part of the high school curriculum. This should be a goal for America.

Legislators must be made to understand that this knowledge gap must be corrected. There was progress toward this goal in the state of California, but the governor vetoed the overall legislation that contained language supporting mandatory sleep education. This is a temporary setback, but we will never give up.

William C. Dement is the director of the Stanford University Center of Excellence for the Diagnosis and Treatment of Sleep Disorder in California. Eileen B. Leary, B.A., RPSGT, is a clinician with the Stanford University Sleep Research Center.

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Curiously there is a species of rattlesnake, the Mojave Rattlesnake, a pit viper found in Arizona and parts of California, with a venom that contains a special toxin named Type-A Mojave Toxin. This particular toxin is also neurotoxic and has been shown to cause respiratory paralysis. Fortunately an antivenom approved in October 2000 by the FDA, contains antibodies to this toxin. Provided this antivenom (Cro-Fab™) is administered in time, bites by this species rarely progress to respiratory failure. However RTs faced with seeing Mojave A-type snakebites should keep in mind that intubation and mechanical ventilation also may be necessary for this type of victim if Cro-Fab is not available.

There is concern that the Mojave A-type toxin may show up in other species of rattlesnakes, but bites by these are rare. The most serious effects of most pit viper bites, including that of rattlers, is extensive local tissue damage and serious coagulopathies.

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